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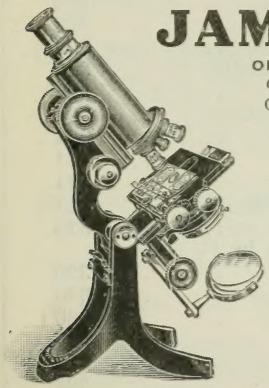

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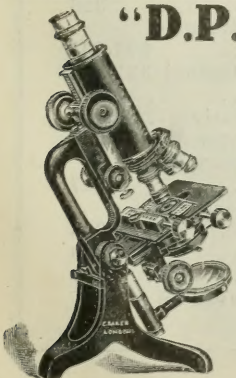

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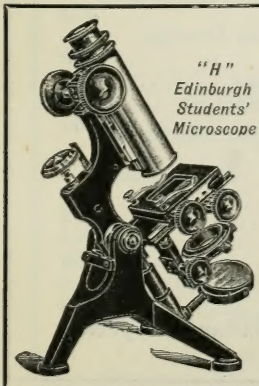

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TROPICAL DISEASES BULLETIN.

Vol. 16.] 1920. [No. 5.

MALARIA.

WENYON (C. M.). **Carriage of Malaria by Hibernating Mosquitoes.** [Correspondence.]—*Lancet.* 1920. July 3. p. 42.

During the summer and winter of 1918 large numbers of mosquitoes were captured in Lehanah village, in the Balkans, where there is a high ague rate among the children, and where *A. superpictus* abounds. On dissection, the oocysts were normal, and the question arose whether the oocysts of those taken in the cold weather would continue their development when the temperature became higher. In the Macedonian villages mosquitoes hibernate in barns and cowhouses situated below living apartments; hence the temperature in them is considerably higher than in empty barns where mosquitoes are scarce.

In mosquitoes fed on malarial blood which were afterwards incubated for a week, the development of the oocysts could be completely arrested by exposing the mosquitoes to a temperature corresponding to that of the winter hibernation. After three weeks of such artificial hibernation the oocysts continued their growth when the mosquitoes were again incubated at a higher temperature. The oocysts in the mosquitoes captured in the winter resembled in every way those seen in the experiment. It seems clear therefore, that malarial parasites survive in mosquitoes during the winter. Exposure of mosquitoes in which the oocysts had not attained their full growth, to a low temperature for twelve hours in the ice-chest did not cause degeneration of the oocysts, whereas an exposure longer than twelve hours brought this about. Hibernating mosquitos then should be destroyed.

[MITZMAIN (see this *Bulletin*, Vol. 10. pp. 153 and 176; and Vol. 11. p. 32) failed to find any trace of infection in 1,582 hibernating anophelines captured in the Mississippi Delta and Alabama except in two caught at the end of September. In one taken on November 15th a single degenerated oocyst was discovered. In his experiments on the effects of exposure of infected mosquitoes to low temperatures intermittently, he found that the oocysts' development was arrested before it was complete, and he concluded that mosquitoes infected before the winter sets in, become harmless during hibernation.]

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(707) P1/29 1,500. 11.20. B.&F.Ltd., Gp.11/14. A

i. James (S. P.) ; ii. Hehir (P.). **Hibernating Mosquitoes as Carriers of Malaria.** [Correspondence.]—*Lancet.* 1920. July 10. p. 99; July 24. p. 217.

i. Although most indigenous malarial infections in England occur in August and September, some may take place in May, which can be satisfactorily explained by supposing the *A. maculipennis* infected in the autumn is still a carrier in the spring.

ii. In the United Provinces and the Punjab there appear to be two malaria seasons, one in late spring and early summer, and the other in the autumn after the monsoon. In order to explain the occurrence of the former an investigation into the infectivity of hibernating mosquitoes is advisable. C. B.

Swellengrebel (N. H.). **Rapport over proeven nopens de ontwikkeling van malariaparasieten in eenige Anophelinen.—Report on Experiments upon the Development of Malaria Parasites in some Anophelines.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1919. Pt. 9. pp. 53–71. With 4 curves & 9 tables.

This is a more detailed account of the important experiments reported on pp. 420 and 421 of Vol. 15 of this *Bulletin*. The mosquitoes were fed on the malarial patients twice daily for 4 to 8 days. The smallest number of gametocytes in the blood of these cases was 80 per cc. The results of the experiments on a total of 1,058 mosquitoes are given in the table.

It is seen that *A. ludlowi* is the most important vector, but it appears to have no affinity for the quartan parasite.

In advanced stages of infection, the oocysts in the stomach of the mosquito may completely disappear, while the salivary glands contain sporozoites. Attempts to infect *A. albotaeniatus*, *A. indefinata* and *A. leucosphyrus*, 37 in number, all failed.

The subjects of the human experiments to which reference was made in the former summary were Swellengrebel himself and his wife. Mrs. Swellengrebel submitted to the bites of two *A. ludlowi* which had fed on a crescent carrier 11 to 13 days previously, and in the salivary glands of which sporozoites were found, and again to their bites four days later. Thirteen days after their first bite she developed a four-day attack of subtertian ague. She received quinine treatment in doses of 0·6 to 1·6 gm. a day for 12 days. Not long afterwards she was repeatedly bitten by *A. sinensis* which had been infected with *P. vivax* 13 days before. Twelve days later she had a mild two-day seizure of benign tertian ague from which she recovered under a gram of quinine a day for a week.

Swellengrebel was bitten by one *A. ludlowi* infected with crescents, out of the same batch which infected Mrs Swellengrebel, and again two days later, He went through a 4-day attack of subtertian ague which came on 12 days after the first bite. He recovered under 0·8 to 1·6 gm. of quinine a day for nine days.

On another occasion an *A. sinensis* with sporozoites in its salivary glands, 11 days after feeding on a benign tertian patient, sucked his blood. After an incubation period of 12 days Swellengrebel was attacked with benign tertian ague which lasted three days, and for which he took 0·8 to 1·6 gm. of quinine a day for a week. C. B.

Mosquitoes fed on blood of	*A ludlowi.*				*A. sinensis.*				*A umbrosus*		*A. barbirostris.*		*A. punctulata.*		*A. kochii.*	
	Stomach.		Salivary Glands.		Stomach		Salivary Glands.		Stomach.		Stomach,		Stomach		Stomach.	
	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.	Mosquitoes examined.	Infected.
Subtertian carriers ..	37	36	9	7	292	15	2	2	87	—	10	—	23	1	5	—
Tertian carriers ..	47	35	8	7	175	64	33	25	104	5	15	2	10	—	6	1
Quartan carriers ..	15	—	—	—	188	2	—	—	6	—	1	—	—	—	—	—
Total ..	99				655				197		26		33		11	

Mayne (Bruce). **Can the Mosquito Convey Infection from a Malaria Patient undergoing Treatment? Does Sporogony affect Mosquito Life?**—*Public Health Rep.* 1920. July 9. Vol. 35. No. 28. pp. 1664–1669. With 2 text-figs.

Loeffler in the year 1905 stated that Gualdi and Martirano found that a considerable percentage of laboratory-bred anophelines which had been fed on crescent carriers after large doses of quinine, became infected, but that Schoo obtained negative results with similar experiments with mosquitoes fed on benign tertian carriers. One gram of quinine was sufficient to prevent the infection of the anopheles. Mayne confirms Schoo's observation. Darling in 1910, wrote "Nearly all the infecting experiments were conducted on patients who were receiving the routine ward treatment of quinine sulphate, grains 10, thrice daily in solution (one had taken 450 grains before the experiment) so that, apparently, quinine in these quantities has no destructive or inhibitive effect on the parasite because the zygotes go on to maturity and sporozoites (*P. falciparum*) appear in the salivary glands in from 9 to 11½ days." Barber also in 1918, showed in numerous experiments that human carriers were able to infect anophelines when quinine was administered in curative doses. Bruce Mayne allowed an *A. quadrimaculatus* to suck the blood of a patient who had received 400 grains of quinine sulphate, and again on a second occasion after the carrier had been given 80 grains more. A fortnight afterwards the mosquito was allowed to bite a healthy person who developed subtertian ague 11 days later, *P. falciparum* being found in the blood. The sporonts in the mosquito were typical and unchanged by the quinine administration to the carrier. The infection appears to have but little effect on the health of the mosquito. In stomachs in which the oocysts have been discharged, nothing remains but their enveloping capsules, and repair seems complete. Roubaud found that *A. quadrimaculatus* survived infection with *P. falciparum* 125 days. A few dead sporozoites were discovered in one of the salivary glands. Under similar conditions the author kept alive for 185 days an *A. punctipennis* which was fed on raisins and dates. Another specimen fed on a *P. vivax* carrier survived 158 days. A few degenerating sporozoites were seen in two lobes of its salivary glands. They appeared to be dead. Between 250 and 400 oocysts have been present in some of the stomachs of the mosquitoes examined by the author. He found that infection of the anopheles resulted if the blood of the carrier contained only one gametocyte of *P. vivax* to 650 leucocytes. [See Clarke's experiments below.]

C. B.

Davies (D. S.); Kerfoot (S.); Clarke (Cecil). **Malaria. A Discussion at a Meeting of the Bristol Medico-Chirurgical Society on December 10th. 1919.**—*Bristol Med.-Chirurg. Jl.* 1920. Mar. Vol. 37. No. 138. pp. 38-50.

There have been no indigenous cases of malaria reported in Bristol, but 110 have been notified which were contracted abroad. Three deaths occurred. Palestine, Sierra Leone, and Salonika were the places where the fatal infections were contracted.

Davies stated that in comatose cases as much as 200 grains of quinine were given intravenously in three doses in 48 hours with good results and with no toxic symptoms of importance. He believed that there were no cases of toxic amblyopia in Salonika with doses of less than 120 grains of quinine.

Two weekly injections of 0·3 gram of galyl appeared in three cases to raise the red count from 1 to 2 million to 3½ to 4½ millions in 18 days. Eleven such injections were administered to a man with quinine idiosyncrasy, who was almost moribund. Salvarsan, kharsivan, phosphorated oil, and sodium cacodylate injections were tried with indifferent success. Many cases of profound anaemia, with the red corpuscles no more than a million, owe their lives to transfusion of whole blood. The donor's blood cells must be tested for agglutination with the serum of the patient. The erythrocytes of only about one in three persons are suitable. A spherical glass vessel of 2 pints capacity with a vein cannula below, and a tubed cork above is sterilised, and the interior coated with sterile paraffin. The cannula is inserted into the distal end of the donor's vein and about a pint and a half of blood allowed to flow into the vessel. The cannula is then introduced into the central end of the patient's vein and the transfusion is aided by pumping air into the container through the tube at the top. Next day the number of erythrocytes will be half to one million more than before, and will gradually fall during the following two or three days; then it remains stationary until the patient's power of producing more red corpuscles returns.

C. Clarke stated that the type of ague in Macedonia was more severe than that of Mesopotamia. He found no parasites in 20 films of invalids from East Africa, but *P. vivax* in 40 per cent of 60 slides of men from Macedonia, who had been treated continuously with quinine, but were anaemic with splenic enlargement. He referred to Dudgeon and his papers already summarised [see this *Bulletin*, Vol. 9. p. 457. Vol. 11. p. 31 and Vol. 15. p. 19.] The ague case-mortality in Macedonia was 1 per cent. In 114 fatal cases death occurred within two days. Primary *P. vivax* infections were first seen in the last week of April, whereas the *P. falciparum* was not observed until early in June. A probable explanation of Dudgeon's negative results in obtaining growths of *P. vivax* is that they used the patient's own serum, which was not free from quinine. Repeating Bass's original technique it was found that *P. vivax* did not proliferate in serum from a person who had been treated with more than 20 grains of quinine in the previous twenty-four hours. On the other hand a *P. falciparum* strain developed vigorously in the serum of a patient who had taken 10 grains of quinine daily for five months, and 40 grains in the 24 hours preceding the withdrawal of the blood. No growth takes place without the presence of 0·5 per cent. glucose in the test-tube. In the circulating blood 0·08 to 0·1 per cent. is the normal amount, but after muscular effort and fatigue the proportion may be increased. It is suggested that this may be a factor in the causation of relapses. [See Yoshida & Ko in this *Bulletin*.]

C. B.

Woodcock (H. M.). **Notes and Comments upon my Malaria Experiences while with the Egyptian Expeditionary Force, 1916–1918.**—*Jl. Roy. Army Med. Corps.* 1920. May; June. Vol. 34. Nos. 5 & 6. pp. 385–396; with 6 text-figs. pp. 471–483, with 1 text-fig.

In the year 1916 there was no malaria in the Southern Canal zone from south of Ismailia to Suez until July. Between August and November, 1916, there were 178 cases among the British troops, 63 per cent. of which were benign tertian and 37 per cent. subtertian. Among the Indian troops there were 192 attacks of which 20 per cent. were benign tertian. Only two quartan infections were discovered, both in the Indian troops. Sinai and Gaza were free from ague. September and October were months of maximum prevalence. In November and December, 1917, there were 231 malarial cases in the British troops, 62 per cent. of which were benign tertian, and the rest subtertian. At Jaffa in February 1918, 23 subtertian and 169 benign tertian infections were found, most of the latter being relapses. In April until the beginning of June, 1918, there was scarcely any ague in the forces N. and N.E. of Jaffa, but by the end of June the malarial season had begun. In July 1918, the British cases amounted to 251, 82 per cent. of which were benign tertian and 18 per cent. subtertian. In the Indians there were 106 cases, 76 of which were benign tertian. In August and September, 1918, 8,300 blood examinations were made. Parasites were discovered in 1,134 of these, the *P. vivax* in about 64 per cent. and *P. falciparum* in nearly 34 per cent. *P. malariae* was found 11 times. After the advance on September 19th, 1918, the epidemic spread rapidly. In the two weeks, September 29th to October 12th, 970 cases were discovered in the bloods of 2,460 patients examined; 86 per cent. of these were *P. falciparum* infections. In the malaria charts left in the German International Hygiene Bureau at Jerusalem, the subtertian incidence is highest at the end of September and the first half of October, the curve rising and falling sharply. The subtertian dies down sooner than the benign tertian infection. Benign tertian ague is the common form in the summer, and is at its maximum in July.

No morphological differences in the Egyptian and Palestine *P. falciparum* could be detected. But the number present in the blood of the Palestine infections was uniformly greater than in those of Suez. The severity of the subtertian ague varies with the number. Frequently one or more parasites were found in the first field of the blood of those examined in Jerusalem. Sometimes *P. falciparum* was seen only as minute rods attached to the edge of the red cells, the so-called "appliquées formes," which are easily missed in badly stained films. On only two occasions out of 1,200 subtertian bloods were parasites discovered on a second examination, and not on the first. On the other hand *P. vivax* were often few in number and were not detected until a third examination.

Intravenous administration of quinine is recommended in preference to intramuscular injection. The secret of success in intravenous medication is the use of a small, sharp, and fine needle. If 12 or 15 grains of quinine bihydrochloride dissolved in 10 or 20 cc. of sterile saline fluid be injected at the rate of half a minute for each cc., no bad

effects were observed. The objection of new arrivals in England from Macedonia to injections was great, because they associated them with the pain and stiffness they endured after intramuscular administration. The author met with more than one R.A.M.C. officer, suffering from the after-effects of intramuscular introduction of quinine, who declared that nothing would ever induce them to submit to a repetition of such treatment. Quinine thrown into the veins in the manner described above offers none of these disadvantages. The writer never found crescents develop in a case after intravenous injection of quinine. Four cases are described in detail which presented cerebral symptoms, or were accompanied with severe vomiting, and were treated successfully with quinine intravenously and afterwards intramuscularly and orally.

C. B.

Fairley (N. Hamilton) & Dew (H. R.). **The Causes of Death from Malaria in Palestine—A Study in Cellular Pathology.**—*Trans. Soc. Trop. Med. & Hyg.* 1920. Feb. 20. Vol. 13. No. 6. pp. 121–125.

In 80 autopsies in which parasites were found, 73 being of the subtertian, 6 of the benign tertian and one of the quartan infection, the causes of death were: uncomplicated subtertian ague 13, bronchopneumonia in which streptococci, diplostreptococci, pneumococci, and sometimes *B. influenzae*, staphylococci and Gram-negative bacilli appeared to be the cause, 47 : bacillary dysentery 15 : septicaemia 5. In three of these *Staphylococcus aureus* was isolated from the blood during life ; in another *B. perfringens* was the invading organism and seemed to be connected with an attack of blackwater fever 18 hours before death. The authors quote Manson-Bahr's figures. Death in 47·6 per cent. of 67 fatal malarial cases was due to secondary infections.

In 20 of the fatal cases in which 3 injections. at least, of 12 grains of quinine bihydrochloride had been given, no parasites were detected in smears of the spleen, but much pigment was present in 16. In uncomplicated malignant malaria inadequately treated with quinine, parasites were numerous in the organs.

In early pernicious cases there is leucopenia both during the fever and afterwards. In 40 pyrexial cases the average count was 5,200, and in 21 apyrexial patients it was 5,700 per cmm. Secondary infections were not accompanied with leucocytosis as a general rule.

The average differential count of 50 uncomplicated cases was,

Polymorphonuclears	53·34 per cent
Lymphocytes	25·54 ,,
Large mononuclears and transitionals ..	21·03 ,,
Basophils	0·08 ,,
Eosinophiles	0·01 ,,

The more chronic the case the higher was the mononuclear count ; the neutrophile leucocytes were also decreased relatively and absolutely and the eosinophiles were almost entirely absent.

In 10 of the most pernicious subtertian infections the haemoglobin ranged from 10 to 50 per cent., the red cells from 1 to 3 million, the leucocytes from 3,000 to 12,000, and the colour index from 0·3 to 0·8.

Retinal and intestinal haemorrhages, jaundice and haemoglobinuria, haemic murmurs, polychromatophilia, anisocytosis, poikilocytosis, megalocytes, megaloblasts and normoblasts in the blood films simulate pernicious anaemia. In the latter disease, however, the colour index is not subnormal. In an average case 4 to 8 weeks after infection the red cells are three and a half million, the haemoglobin 60 per cent., and the colour index 0·8.

In smears of the marrow of a lower rib the nucleated reds sometimes amounted to 50 or 60 per cent. of the cells, many being of the megaloblastic type with faintly acidophile cytoplasm, and actively dividing nuclei. Large phagocytes with ingested erythrocytes, leucocytes, parasites, pigment and chromatin, were present. The myelocytes were few and showed no mitotic figures typical of these cells in normal marrow. Myeloblasts, the non-granular precursors of the myelocytes were scanty and exhibited no nuclear activity. These observations indicate that there is a pronounced erythroblastic reaction, but none of the forerunners of the leucocytes. The bone marrow of acute and chronic, complicated and uncomplicated cases was investigated with like results. In pure broncho-pneumonia a leucoblastic response always occurs, but is absent when it supervenes on malignant ague. Hence it is probable that the general immunity of the body is much lowered and it behoves us to avoid sepsis with our utmost efforts.

C. B.

Pearson (Arthur). **Some Notes on Fifteen Years' Experience of Malaria in the Upper Congo.**—*Jl. Trop. Med. & Hyg.* 1920. July 15. Vol. 23. No. 14. pp. 177–180.

The *P. falciparum* of Katanga, Belgian Congo, although indistinguishable microscopically from that of the Lower Congo, Sierra Leone, and German East Africa, causes a much milder illness. Under quinine the parasites disappear rapidly and fever subsides within four days. In only one case of local origin were relapses frequent, which ceased after six weekly injections of 5 grains of soamin combined with quinine by the mouth. Cerebral malaria is uncommon, but there seems to be a proclivity to blackwater fever. This complication was never observed in those who took 5 grains of quinine a day prophylactically. No ill effects were noted except in one individual, in whom even one grain doses caused urticaria. He was attacked with blackwater fever after some months residence in the country. Twenty grains of quinine bisulphate by the mouth a day, for a week, reduced to fifteen grains [period not stated], and then to ten grains daily for a week are sufficient to cure ague in Katanga. Three daily intra-muscular injections of quinine bihydrochloride, followed by 15 grains by the mouth for three days and then 10 grains daily for a week were also largely used. The author states that in his experience of an enormous number of these injections no harm has resulted, although pain and slight induration may be complained of for three days. The fifteen grains of quinine were dissolved in 30 minims of water, and the solution was boiled before use, and the skin painted with tincture of iodine. The upper and outer quadrant of the gluteal region was the site of injection. Five grains of quinine given intramuscularly twice daily in blackwater fever did not increase the haemoglobinuria.

C. B.

Leger (A.). [**Le paludisme à Dakar en milieu indigène.**]—*Bull. Soc. Méd. Chirg. Franc. de l'Ouest Africain*, 1919. June. Vol. 1. pp. 3–5. [Summarised in *Bull. Inst. Pasteur.* 1920. Apr. 15. p. 253.]

At Dakar the malaria index of 240 native children, aged one month to 15 years, was 39 per cent. during the dry season, and 82 per cent. during the rains. The relative proportions of *P. falciparum*, *P. malariae*, and *P. vivax*, were 48, 29, and 23 during the former period and 91 ; 7 ; and 2 during the latter. Between 75 and 80 per cent. of the anophelines captured in that city were *Pyretophorus costalis*. *Myzomyia funesta* and *Cellia pharoensis* were also found.

C. B.

Hamet. **Le paludisme à Dakar dans le personnel du point d'appui de la Marine.**—*Arch. Méd. et Pharm. Nav.* 1920. June, July ; Vol. 109, 110. Nos. 6, 1. pp. 401–437, 5–33.

The writer states.—" We have made numerous examinations of the blood of our patients at Dakar, but in our experience this search for the parasite is often deceptive. . . . In the first attacks of fever the plasmodium is not always found, whereas in subsequent returns of fever it may be." About 1,600 febrile cases came under his observation of which he gives a clinical analysis, but in the absence of exact laboratory investigations, it seems that many of the pyrexias were not malarial, although he regards them as such.

C. B.

d'Anfreville (L.). **Le Paludisme à Casablanca (Maroc).**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 334–336.

Malaria has caused a considerable amount of inefficiency among the French troops occupying Morocco. In the vicinity of Kenitra and the Sebou there is a large tract of marshy country which is almost uninhabitable on account of ague. Preventive measures should succeed, since the climate on the whole is not so unfavourable. Swamps and collections of water are not extensive. The river Bouskoura, which flows through Casablanca, widens into a swamp before it empties itself into the sea. This stream, and its tributary the Korea, require canalisation.

C. B.

Herber (J.). **Le paludisme au camp de . . . (Maroc). Ses causes.**—*Presse Méd.* 1920. May 19. Vol. 28. No. 32. (Supplément) pp. 601–602. With 1 text-fig.

In a camp in which mosquitoes were rare, 55 febrile attacks occurred among the 300 troops. There is no record of any microscopical examination of the blood or of the clinical symptoms. It seems probable that it was an outbreak of sandfly fever. The author however assumes that the infection was malarial and that there was some other vector than the mosquito by which it was transmitted.

C. B.

Kortewec (R.). **A propos de l'article de M. Herber sur le paludisme au camp de. . . .** [Correspondence.]—*Presse Méd.* 1920. July 3. Vol. 28. No. 45. pp. 847–848.

Herber supposed that the distribution of the febrile attacks among the tents pointed to some vector incapable of flight. The author calculates the number of cases there should be in each tent by the laws of chance. The figures he obtains accord closely with the numbers given by Herber. Hence the chance distribution does not exclude a winged carrier of the infection.

C. B.

Gill (C. A.). **Note regarding Malaria in Kashmir.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 610–617.

The average height of the Valley of Kashmir is 5,000 to 6,000 feet. In E. Neve's long experience of the vicinity of Srinagar, indigenous malaria does not occur, but it is found at Baramulla, 5,100 feet, Uri, 4,000 feet and Domel 2,500 feet. In the year 1912, Adie examined with negative result blood films of 101 children of the boatmen of Dal Lake, and of 79 other infants. In June, Gill captured a few *A. barianensis* and *A. plumbeus* at Nasim Bagh, Srinagar, and four larvae of *A. wilmori* in Sind Valley. The last named mosquito was breeding in considerable numbers in the numerous streams which flow into the Dal Lake, over an area of 8 square miles. At Gulmarg in August and September, *A. wilmori* adults were caught in the houses of Europeans. *A. lindesaii* and *A. simlensis* larvae were seen in the pools at Gulmarg, but no adults were captured in houses. The anophelines of Kashmir are those of the Himalayas generally, of which *A. wilmori* is a carrier of malaria. Lower down in the valley of the Jhelum, at Kohala, 2,000 feet, besides *A. wilmori*, the carriers *A. maculipalpis*, and *A. stephensii* are plentiful, and *A. listoni* also is found, as well as the *A. lindesaii*. Swarms of culicines breed in profusion in Kashmir.

The examination of 123 children in six villages in the Kangra, Kulu, and Simla districts, situated at heights from 6,000 to 8,900 feet showed that the spleen and parasite rates were zero, although the carriers *A. maculipalpis*. *A. fuliginosus*, and *A. wilmori* were found in several of them ; hence the elevation above sea-level seems to be the determining factor in causing the absence of malaria in Kashmir, since every other condition appears to be favorable for its existence.

C. B.

Gill (C. A.). **The Relationship of Malaria and Rainfall.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 618–632. With 4 charts.

The title of this paper is inaccurate, for it is not a study of malaria and rainfall, but of the " fever " mortality of the general population, given in the Annual Reports of the Sanitary Commissioner with the Government of India, and rainfall. Now the population of India is so vast and scattered, and the majority of deaths occur in those who have had no medical attendance, that the causes of death are unknown. It is the village watchman who can rarely read or write who is responsible

for reporting deaths. On page 982 of TURNER and GOLDSMITH'S Sanitation in India, 2nd edition, 1917, with reference to the classification of the causes of death in the above-named Reports, we read "The heading 'Fever' as is well known, is absolutely misleading and about as useful as that of 'All other causes.'" For reliable health statistics in India we must turn to the Tables of the British Troops published in these Reports. In the British military hospitals, laboratory facilities exist for precise diagnosis. In any statistical enquiry unless the units are of the same class, the correlation coefficient is meaningless. For the study of malaria the slide-rule cannot replace the microscope.

C. B.

SCHÜFFNER (W.). **Twee onderwerpen uit de Malariaepidemiologie. Two Subjects from the Epidemiology of Malaria.**—*Meded. Burgerlijk. Geneesk. Dienst Nederl.-Indië.* 1919. Pt. 9. pp. 1–52. With 4 charts in text & 1 folding plate.

Parts of Sumatra are highly malarious. At Rao and Panti splenic enlargement was found in 97 per cent. of 183 persons examined. At Padang Sidemporean the splenic index among 390 children was 81, and in 102 adults 77 per cent. In May 1916 at Mandailing with a population of 17,000, 86 was the index of 1,052 children to the age of 15, and 90 that of 1,449 adults. In September 1917, the splenic index of 1,883 children varied from 87 for infants of one year and under, to 96 for children between 14 and 15, and it remained about 90 for 1,383 adults. Enlargement of the spleen may be much delayed, and may be absent in some cases of severe cachexia. On examination of the blood by the thick drop method plasmodia were discovered in 15 out of 153 children in whom the spleen was not palpable, and in 9 out of 137 adults. Of 964 cases of ague in Mandailing 594 were subtertian, 234 were quartan, and 136 were benign tertian. The incidence of the benign tertian is greatest in infants up to four years of age, that of the quartan in children to the age of 15. On the other hand the proportion of crescent carriers is largest in infants; of 129 under one year, 14 harboured crescents, whereas these were found in only about one per cent. of adults. The number of crescents in the blood of infants is larger than in the blood of adults; hence children are the principal sources of infection, for during the first two years of life 50 per cent. of the children in Mandailing who are infected with *P. falciparum* produce crescents. This ratio is only 8 per cent. of subtertian agues in adults.

The birthrate is not decreased by malaria at Mandailing. It is 49 per thousand. The death rate is 45 per thousand.

Investigations were made into a sudden outbreak of ague at Soendatar on the West Coast of Sumatra, in a community which hitherto had been almost exempt from paludism. Early in the epidemic, about one fifth of 448 children and adults were plasmodia carriers. During the height of the outbreak 77 per cent. of the children and 56 per cent. of the adults were carriers, 618 individuals being examined. Seventy-two per cent. of the attacks were caused by *P. falciparum*.

C. B.

Swellengrebel (N. H.) & Swellengrebel de Graaf (J. M. H.). **Studies on the Various Types of Malarial Infection and the Effect of Quinine Treatment thereon among the Native Population of the Malay Archipelago.**—*Ann. Trop. Med. & Parasit.* 1920. June 30. Vol. 14. No. 1. pp. 41–71. With 14 charts & 18 tables.

Many parts of Sumatra and the north coast of Java are highly malarious. Examination of several thousands of the population of Samarang revealed a splenic rate of over 80 per cent., and a parasite rate of between 24 and 38 per cent. in children. Ninety per cent. of about 600 of the inhabitants of North Soendatar, Sumatra, suffered from enlarged spleens with a corresponding high parasite rate. Along the coast, *A. ludlowi* is the chief carrier. Together with *A. rossi* it breeds in salt water pools overgrown with algae. In June these swarm with their larvae, but at the end of the dry season as the water becomes more and more saline, usually in September and October, *A. ludlowi* disappears and only the larvae of *A. rossi* are found. In the interior, *A. ludlowi* is scarce or absent; the vector then is either *A. aconitus* or *maculatus*, or *leucosphyrus*. Most cases of ague occur during the dry season in July and August. Malaria may be distinguished as endemic when there is a high spleen rate throughout the year with exacerbations during the dry months, and as epidemic when severe outbreaks occur in districts which are generally immune. In endemic areas 2·6 per cent. of 5,613 *A. ludlowi* were infected. In epidemic districts 20 per cent. of 611 *A. ludlowi* contained oocysts. *A. rossi* showed a rate of infection of 0·3 per cent. in endemic areas and 3 per cent. in places where an epidemic prevailed. Children are the chief carriers in endemics, whereas in epidemics both children and adults harbour gametocytes. At the beginning of an epidemic there may be many carriers without enlargement of the spleen. Adult newcomers from a healthy locality after arrival at an endemic district show numerous crescents in their blood like children. Such people form an additional source of danger. Out of ten *A. ludlowi* captured in the house of one of them, seven were infected, while only 19 of 229 caught in the adjoining native houses were infected. Again, four out of six *A. ludlowi* captured in the house of a European family where two of the five children were crescent carriers, were infected, the rate in 101 controls being only 4 per cent.

During the epidemic at North Soendatar quinine was given to those attacked in doses of 0·2 gm. to infants, gradually increasing with age to 1 gm. for adults, daily for a week; 861 of the 1,264 inhabitants were thus treated. After a month, both the spleen and infection rate became reduced, more so in the adults than in the children. In South Soendatar the epidemic was on the increase when quinine treatment was begun. The spleen and infection rate rose, but the benign tertian and quartan fevers were reduced in the adults; the increase was due to subtertian infections. The percentage of carriers without enlarged spleen was high before quinine treatment and increased afterwards. In the epidemic at Modjodjedjer 290 of the population of 640 were given daily 0·2 to 1 gm. of quinine for children and 1·2 gm. for adults for from four weeks to four months. The crescent rate, which had been highest in adults, sank almost to zero in them but it rose in children. The number of parasite carriers without splenic enlargement,

which had been great, after three months became less. Quartan ague was common at the end of the epidemic and, as the average splenic enlargement is highest in quartan infections, the increase in the spleen rate may have been due in part to this cause. Ague is endemic at Margaredjo, which is situated near *A. ludlowi*-breeding salt water swamps, and fishponds. A missionary school is established there in which the treatment and after-treatment of malaria among scholars are efficiently carried out. The spleen and infection rates are low. The tertian and quartan agues rapidly disappear among the infants, leaving a small proportion of subtertian infections among the older class.

With regard to the influence of quinine on mixed infections, these were found in 15 per cent. of 605 children before treatment with quinine, and in 10 per cent. of 259 after. The corresponding ratios in adults were 10 per cent. of 484 before, and 3 per cent. after quinine treatment.

C. B.

Mollow (W.). **Ein Malariagesetz in Bulgarien.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 5. pp. 129–132.

Ague is widespread in Bulgaria. In the year 1909, the Minister of Health inaugurated quinine prophylaxis, and from 1910 to 1912 other anti-malarial measures were adopted in the most unhealthy Districts, Bourgas, Philippoppel and Widin, and were attended with considerable success. After the outbreak of war in 1912 till 1913 every sanitary precaution was neglected. From 1915 to 1918 the Bulgarian troops were campaigning in the ague-stricken parts of Macedonia. Some 400,000 cases occurred among them. Until the supplies of quinine were exhausted, quinine prophylaxis was carried out, with little benefit however. In 1918, an anti-mosquito campaign was actively conducted with better results.

With so many carriers now distributed throughout the country the epidemic has extended. Sofia, hitherto almost ague free, has become malarious. Stringent laws have been enacted to suppress the disease, with provisions made for anti-malaria propaganda. It is difficult to see how they will be carried into effect when the state of the Bulgarian Exchequer is considered.

C. B.

Despouys (Jacques). **Quelques considérations sur le paludisme macédonien.**—*Caducée.* 1920. Apl. 15. Vol. 20. No. 8. pp. 104–106.

The heat in the marshy and treeless valleys of the Vardar and Cerna is intense during the summer, and the breeding places of mosquitoes are innumerable. The inhabitants are all cachectic. Ague was rampant among the troops which held the line of the rivers, notwithstanding quinine prophylaxis, and a supply of mosquito nets. These were so small that the heat beneath them was insupportable. Among the soldiers who arrived from France in June to October, there were severe attacks of ague with frequent relapses notwithstanding intramuscular injections of 1·8 gm. of quinine hydrochloride. Vomiting, severe headache, giddiness, painful and enlarged spleen, and sometimes

fatal collapse were noted. On the other hand the type of ague was milder in the men who landed after the hot season. Under 3 grams of quinine by the mouth the temperature fell to normal next day, and relapses were fewer. But pernicious attacks were observed in those men who had passed the summer unscathed, in their second year. Blackwater fever also occurred among them.

C. B.

Herms (William B.). **Occurrence of Malaria and Anopheline Mosquitoes in Middle and Southern California.**—*Public Health Rep.*, 1920. Feb. 6. Vol. 35. No. 6. pp. 275–281.

A report on the mosquito survey of Northern California has already been published [see this *Bulletin* Vol. 14. p. 262]. Thirty-one per cent. of 2,806 mosquitoes captured in Middle California were anophelines. Of these 46 per cent. were *A. quadrimaculatus*, 11 per cent. *A. punctipennis*, and 43 per cent. *A. pseudopunctipennis*. The average annual malaria death rate (1909–1918) was 4·7 per 100,000. The malaria incidence and the prevalence of *A. quadrimaculatus* and *A. punctipennis*, which are malaria carriers, is approximately the same in Northern and Middle California. In Southern California 50 per cent. of 814 mosquitoes were anophelines, thirty-one per cent. of which were *A. quadrimaculatus*, and 69 per cent *A. pseudopunctipennis*. *A. pseudopunctipennis* does not convey ague. The average annual malaria death rate for the 10-year period was only 0·9 per 100,000. The Sacramento Valley resembles the San Joaquin Valley, but it has a malaria death rate nearly twice as high. Forty seven per cent. of all mosquitoes collected in the Sacramento Valley were *A. quadrimaculatus* and *A. punctipennis*, but only 19 per cent. of the San Joaquin mosquitoes were these ague-carrying anophelines.

The coastal counties of California give a very low malaria rate, and a very high percentage of the harmless *A. pseudopunctipennis*. It is possible to travel many miles in the dry parts of Southern California without seeing any mosquitoes.

C. B.

Herms (W. B.). **What shall we do with our Information concerning Malaria in California?**—*Mthly. Bull. California State Bd. Health*, Sacramento, 1919. Dec. Vol. 15. No. 6. pp. 181–189. [Summarised in *Rev. Applied Entom.* 1920. May. Vol. 8. Ser. B. Pt. 5. pp. 92–93.]

The ague rate in California has undergone a reduction of 60 per cent. in the last decade. Thirteen counties in the State covering an area of 20,000 square miles give rise to three fifths of the malaria of the State, and in 1916 had a death rate of 14·2 per 100,000 which is more than twice that of the malarious State of Mississippi. The financial loss to California caused by paludism is at least £320,000. The annual estimate for control measures is only £20,000. Neither irrigation works nor rice-culture need increase ague.

C. B.

MacDonald (Angus). **On the Relation of Temperature to Malaria in England.**—*Jl. Roy. Army Med. Corps.* 1920. Aug. Vol. 35. No. 2. pp. 99–119.

It is probable that ague has never existed continuously in the British Isles, and that the *Plasmodium vivax* has been the sole infecting agent. There were extensive outbreaks in the years 1823 to 1826, and 1857 to 1860. Records of temperature in England are available from the year 1763, and the assumption appears justified that a mean temperature of about 59° or 60° F. for a period of sixteen days is necessary for the development of the parasite in the anopheles. In only seven of the fifty years 1841–1890 was the monthly mean Greenwich temperature of 59° F. reached in the months June, July and August coincidently; and of these, three were the years 1857–1859. The year 1860 was remarkable for its abnormally cold summer. No other consecutive continuity of hot weather is to be found in the records. The years 1825 and 1826, and 1808 and 1809 are the nearest approach, and there have been isolated years with a summer temperature above the normal. The years 1856–59 presented abnormal ague possibilities, cut short by the phenomenally cold year 1860, in no month of which was a mean temperature reached suitable for plasmodial development. From a study of Macedonian Reports and of the incidence of ague among British troops at Ferozepore, India, it seems that *P. falciparum* requires a higher temperature longer continued than does *P. vivax*. This affords an explanation of the absence of indigenous subtertian ague in England.

Large numbers of malarial carriers arrived in England from the autumn of 1916 onwards. The first outbreak of ague was observed in July 1917. The majority of the 200 indigenous cases reported occurred in Sheppey and Sandwich, marshy districts abounding in *A. maculipennis*. In 1918, 86 attacks beginning in August were notified. On November 1st 1919, the number of indigenous cases was about forty, most of which occurred early in September, in the Isle of Sheppey. The dates of outbreaks in the three years took place about a month after a period of a nearly continuous mean temperature of 60° F.; and the number of attacks varied directly with the extent of this mean temperature, which in the years 1917, 1918, and 1919 was approximately in the ratio 3–2–1. None of these indigenous cases was proved to be the source of infection to others.

In England in the spring of 1918 indigenous ague occurred which the author refers to an early spring infection of the anopheles in which the plasmodial development had been caused by incubation in warm and occupied rooms. In all cases a malarial carrier was in immediate contact with an indigenous case. At that time the mean external temperature was 44° to 51° F. only which, he thinks, precludes the possibility of development of the parasite within the mosquito.

In the winter 1918–19 anophelines were caged in a stable in Kent where they were caught, and were thus prevented from feeding on the animals. They all died within 30 days. The stable harboured thousands of others till the spring.

C. B.

Carter (H. R.). **Malaria in England in 1917 & 1918. An Analysis of Reports and Papers on Malaria Contracted in England in 1917 and 1918, issued by the Local Government Board.**—*Public Health Rep.* 1919. Nov. 14. Vol. 34. No. 46. pp. 2605–2608.

The English experience is of interest in those parts of America where ague was, but is no longer, prevalent. In the author's opinion "the point in these papers which stands out as of prime importance is that with the importation of not less than 15,000 men infected with malaria during three years, the total number of cases reported as contracted in England in two years was only 326, some of which were contracted from pre-existing (indigenous) infection. Very obviously malaria shows little tendency to spread in England."

C. B.

Cazeneuve (H. J.). **Le Paludisme indigène de Lanester près de Lorient.**—*Bull. Soc. Path. Exot.* 1920. June 9. Vol. 13. No. 6. pp. 461–468. With 1 text-fig. & 1 map.

Ague occurs sporadically in the low-lying parts on the West coast of France in the Departments, Morbihan, Loire Inferieure, and Vendée. At Kerhono in Lanester, a suburb of Lorient, there was a sudden recrudescence, associated with excavations for constructing a dock. A dam was built for the reclamation of land in 1905 which resulted in the formation of a swamp. It was in the houses adjoining this that the cases occurred. Twenty five carriers of the quartan parasite and 3 of the benign tertian were discovered, and forty two others bore signs of recent ague. One hundred healthy people gave a history of malaria. In a family of ten, 9 had been affected, 5 of whom were carriers. At Lanester 17 per cent. of 350 children had ague. New infections were noted from the middle of August to the end of September 1919. Infants and recent arrivals were attacked most frequently. The symptoms were most severe in infancy, but no grave complications or deaths ensued. In about one third of the cases vomiting, diarrhoea, and sometimes convulsions, were noted, so that a diagnosis of typhoid, paratyphoid, tubercle, or meningitis was often wrongly made. In the chronic quartan infections enlarged spleen, anaemia and the constant presence of *P. malariae* in the blood were observed. One gram of quinine by the mouth 3 days a week for a month was effective treatment for adults. In untreated cases relapses were frequent in December and January, and again in April and May. The epidemic could not be referred to the arrival of carriers from the wars. Five such certainly had come, but they harboured *P. vivax* and not *P. malariae.*

C. B.

Walterhöfer (G.). [**Ueber Malariarezidiv bei Kriegsteilnehmern, epidemiologische und klinische Beobachtungen.**] [Malaria Relapses in Troops, Epidemiological and Clinical Observations.]—*Beiträge z. Klinik d. Inf.-Kr.* 1919. Vol. 8. No. 1. [Summarised in *Arch. f. Schiffs- u. Trop.-Hyg.* 1920. May. Vol. 24. No. 4. pp. 116–117.]

Relapses among 1,700 malarial patients were most numerous in April, and least from June to August. The old ague curves of North

Europe show a sudden rise in March to reach the highest point in May. The author believes that the view that the parasites develop in the mosquitoes hibernating during the winter in heated rooms, is not sufficient to explain the rise in the ague rate in spring. He considers that the spring cases are relapses of infections contracted in the preceding autumn.

There was nothing remarkable about the malaria of the West, Galicia, Volhynia, and the northern part of the Eastern Front. As the Mediterranean was approached, however, the infection became more severe. The Macedonian cases were particularly obstinate, and refractory to quinine, either alone or in combination with salvarsan, methylene blue, and arsenic. No morphological peculiarities were observed in these more virulent plasmodia. He believes that reinfection is the cause of quinine resistance.

C. B.

Martini (E.). **Kritische Betrachtungen zur Lehre von der Einheit der Malariaerreger.** [Critical Consideration on the Theory of the Unity of the Malaria Parasite.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. May. Vol. 24. No. 4. pp. 100–113.

It is probable that 68 per cent. of the German Troops in the Balkans were infected with ague ; 48 per cent. being caused by *P. vivax*, 8 per cent. by *P. falciparum*, and 12 per cent. being double infections. The writer's own records were lost during the retreat of the German Army. The Balkan experience lends no support to the hypothesis of the unity of the malarial parasite. During his residence at Portobello in the Panama Canal Zone, the American settlement was exempt from ague except an occasional benign tertian case. Subtertian ague was prevalent on the opposite side of the Bay.

C. B.

Pailloz. **Quelques critiques sur le paludisme officiel et sa prophylaxie.** —*Presse Méd.* 1920. May 15. Vol. 28. No. 31. (Supplément.) pp. 581–584.

In the years 1894 to 1896 the author searched for malarial carriers in a very unhealthy part of Tonkin. He found them among those who had never had ague, but were anaemic and were suffering from albuminuria, glycosuria, palpitation, or chronic diarrhoea. He had seen parasites in blood films taken after 10 or 15 consecutive daily subcutaneous doses of 2 grams of quinine. The troops in Salonika were decimated by malaria notwithstanding the oral and hypodermic prophylactic administration of quinine. Before special hospitals were opened for malarial carriers in the XI District, intravenous injections of arsenobenzol had been used. Accidents had originated in consequence, ague attacks had been precipitated and eye complications had occurred. In short the benefit derived from them had been nil and sometimes harm resulted. In years past thousands of ague carriers have returned to France without causing the spread of paludism, and he has little fear that the 70,000 infected men in France in July 1918 have disseminated the infection.

C. B.

Style (A. Hurrell). **After-Effects of Malaria.** [Correspondence.]—*Lancet.* 1920. Mar. 27. p. 736.

Eighteen months' examination of soldiers who have suffered from ague has caused the writer to believe that the number of thickened arteries found among them is abnormal, although their age has been from 20 to 28, and their urine free from albumen. No figures however, are given.

C. B.

Whitwell (James R.). **After-Effects of Malaria.** [Correspondence.]—*Lancet.* 1920. Apl. 17. p. 886.

The writer states that he has examined many hundreds of recruits and he has observed a remarkable degree of arterio-sclerosis in comparatively young and otherwise healthy men. No numbers or blood pressure records are given.

C. B.

Genovese (Francesco). **La malaria castrense. Nota storica.** [Malaria of Camps. Historical Note.]—*Malariologia.* 1919. Oct. 31. Series 1. Vol. 12. (Series 2. Vol. 5.) No. 4–5. pp. 87–94.

A scholarly essay on the part played by malarial epidemics in prostrating armies and determining the issue of many ancient and mediaeval wars. The essay is illustrated by quotations of great medical interest from Livy, Caesar and Cicero.

F. S. Arnold.

Hehir (P.). **The Diagnosis of Malaria.** [Correspondence.]—*Lancet.* 1920. May 1. pp. 982–983.

It was only after years of continuous effort that microscopical examination of the blood was established as a routine practice in the military hospitals of India. The reduction of malaria incidence in published reports is due in part to more accurate diagnosis. In Burmah in the year 1911, blood examinations of 715 doubtful cases of pyrexia were made on three successive days; some 9,000 slides were prepared. Fevers which hitherto had been recorded as "pyrexia of uncertain origin" and ranged from 60 to 80 per cent. of all pyrexias, were reduced to 10 per cent. In one ague case, parasites were not discovered until the 8th day; in two, not before the 7th; in 5, the 6th; in 4 the 5th; in 11 the 4th; in 43 the 3rd; and in 127 not before the 2nd day.

C. B.

Macfie (J. W. S.). **An Observation on the Effect of Malaria in Leukaemia.**—*Ann. Trop. Med. & Parasit.* 1920. Mar. 15. Vol. 13. No. 4. pp. 347–349. With 1 chart in text.

Intravenous injections of one grain doses of tartar emetic were given to a boy suffering from myelocytic leukaemia every second or third day

until 14 grains had been administered in 34 days. His blood contained 326,000 leucocytes per cmm. but no malarial parasites at the beginning of the treatment. On the sixth day ague came on, and *P. falciparum* was found which became more numerous until the 14th day, notwithstanding the 6 grains of tartar emetic which he had taken by this time. His leucocytes, however, had diminished to 105,000 on the second day of his ague attack, and to 62,900 on the ninth day, when quinine was begun in 30 grain doses by the mouth. Malaria parasites were not again discovered but the number of the leucocytes steadily rose until at the end of the course of tartar emetic they were 364,000 per cmm. Hence tartar emetic does not benefit myelocytic leukaemia nor does it prevent malignant tertian ague.

C. B.

Strisower (Rudolf). **Typhusbakteriämie bei einem Malariakranken.** [Typhoid Bacteraemia in a Malaria Patient.]—*Wien. Klin. Woch.* 1920. Apr. 29. Vol. 33. No. 18. pp. 378–379.

A medical officer aged 26, who had enteric fever when 17, served in Albania where he contracted malaria. A relapse occurred some months later complicated with jaundice, followed by a second relapse in five days, when cultures of the enteric bacillus were obtained from his blood, from his bile withdrawn by the duodenal sound, and from his faeces, but not from his urine. Schizonts and gametocytes of *P. vivax* were found in his blood films. A second examination of the faeces a fortnight after the first was also positive. The author regards the case as one of a typhoid carrier in which the malaria caused a lesion of the liver, permitting the dissemination of the typhoid bacilli from the bile into the blood stream, but the resisting powers of the body, indicated by an agglutination titre of 1 in 200, were sufficient to master the invading bacteria and to prevent them from causing fever and the usual intestinal inflammation.

C. B.

Marsden (W. G.). **Malignant Malaria in a Baby. Recovery.**—*Practitioner.* 1920. Mar. Vol. 104. No. 5. (No. 623.) pp. 393–394.

In India an infant aged 7 months had been ailing ten days when her blood was found heavily infected with *P. falciparum* and *P. vivax*, hardly a red cell being free from a parasite. Her temperature was 99° F. and her pulse 160. One grain and a half of quinine bi-hydrochloride was given by the mouth every four hours, and two grains were injected into the buttock. Next day the child was almost pulseless, her temperature 103° and her spleen enlarged. The same treatment was repeated. On the third day only a single benign tertian plasmodium was found, but there were many normoblasts. The temperature was 101° on the fourth day when the quinine was reduced to the oral administration of three doses of a grain and a half, then three quarters of a grain twice a day for ten days, and finally one grain on alternate days for a fortnight. Recovery ensued without a relapse.

C. B.

Haughwout (Frank G.), Lantin (Pedro T.) & Fernandez (Ricardo). **A Case of Acute Mania Associated with *Plasmodium vivax* Infection.** —*Philippine Jl. Sci.* 1919. Dec. Vol. 15. No. 6. pp. 563–569. With 1 text-fig.

A youth with a spleen which descended 10 cm. below the ribs, whose blood contained a few benign tertian parasites, and 8 per cent. eosinophiles from a concomitant ankylostoma infection, was treated with X-rays. Eight days after the exposure he became violently maniacal, and died of exhaustion in the course of a few days. He was given intramuscular injections of quinine and urea, adrenalin, and oil of chenopodium by the mouth. His blood on the day before death contained only 1 per cent. eosinophiles and 14 per cent. mononuclears. No signs of syphilis were found on post mortem examination. [See this *Bulletin* Vol. 11, p. 295.]

C. B.

Labbé (M.) & Canat (G.). **Etudes sur le foie des paludéens.**—*Jl. Phys. et Pathol. Gén.*, 1918. Vol. 17. pp. 836–848. [Summarised in *Bull. Inst. Pasteur.* 1920. Apr. 15. p. 249.]

In malaria an abnormal pigment is elaborated which infiltrates the tissues and is eliminated by the urine. It has the colour but not the chemical reactions of bilirubin. It seems to be intermediate between haemoglobin and bilirubin.

C. B.

Cordier (V.). **Les réactions de la plèvre et du péritoine au cours de l'impaludisme (Pleurésies et péritonites palustres).**—*Ann. de Méd.* 1919. Vol. 6. No. 2. pp. 89–109. With 1 fig.

Four cases are reported in which the abdominal symptoms were so urgent as to render the diagnosis of perforation probable ; they were also remarkable by the sudden appearance and equally sudden disappearance of effusions into the peritoneal and pleural cavities.

Case 1. Nine days after a relapse of ague contracted four months previously in Macedonia, symptoms of "acute abdomen" came on suddenly. Vomiting was incessant, and there was intense pain in the neighbourhood of the spleen. The pulse was small and 140. Next day ascites was noted. The fluid obtained by exploratory puncture was blood-stained, highly albuminous, and clotted slowly. Rivalta's reaction was positive. No plasmodia were discovered in the sediment, 7 per cent. of the cells of which were polynuclears, 90 per cent. mononuclears, 2 per cent. eosinophiles, and 1 per cent. endothelial. *P. vivax* was present in blood films. On the following day blood-stained fluid was withdrawn from the left pleural cavity, the percentage of the cells in which were, mononuclears 90, endothelial 4, eosinophiles and polynuclears each 3. Quinine had been freely given both by mouth and intramuscular injection from the beginning of the relapse, and the effusions in both cavities disappeared in a few days. Tubercle as a cause of the effusions was excluded as inoculation of animals with the sediments was negative. Plasmodia however were not discovered in either fluid.

Case II. On the fifth day of a relapse of ague in which *P. vivax* was found, contracted in Salonika nine months previously, effusion into the left pleural cavity was observed. The fluid drawn off by exploratory puncture was deeply blood-stained, and clotted rapidly. Microscopically there were many red corpuscles, but plasmodia were not seen in any of them. The mononuclears amounted to 70 per cent., polynuclears 22, endothelials 3,

eosinophiles and lymphocytes of each one cent. There were no signs of effusion eleven days later. Animal inoculation was negative. Subsequent malarial relapses were not again complicated with pleural effusion.

Case III. During a severe relapse of ague contracted in Macedonia nine months before, intense pain in the abdomen was suddenly complained of. It was accompanied with hiccough, vomiting, and great tenderness of the whole of the abdomen, constipation, and delirium. No ascites was observed, but the abdomen became tympanitic. The symptoms subsided gradually, but abdominal palpation was impossible for ten days on account of the tenderness.

Case IV. Eight hours after the onset of an ague attack, a relapse of an infection contracted in Macedonia six months before, the patient was seized with sudden and violent pain in his abdomen, most intense in the hypochondria which were too tender to palpate. Hiccough and vomiting ensued. Pulse 150. The abdomen was retracted. On the third day after treatment with quinine injections he was better, and his temperature fell to normal after being 40° C. for 48 hours. The rigidity of the abdominal parietes disappeared. Four days later he had jaundice with tenderness in the site of gall bladder, which continued for a week. There was no repetition of these symptoms during his successive relapses.

C.B.

Porot (A.). **Méningites paludéennes.**—*Lyon Méd.* 1920. May 10. Vol. 129. No. 9. pp. 388–392.

A man, aged 30, contracted ague in South Africa and was liable to frequent relapses, the last of which was complicated with delirium, convulsions, conjugate deviation of the head and eyes to the left, Kernig's sign, and opisthotonos. The cerebro-spinal fluid was under moderate pressure, and contained 0·5 per thousand albumen, but no sugar. The lymphocytes were normal in number, and there were no polynuclears, microbes or parasites in the fluid. The coma deepened in spite of injections of 1·5 gm. of quinoform, and ended in death. There is no record of a post-mortem examination.

A man aged 38, was attacked with ague complicated with meningeal symptoms. Kernig's sign, squint and vomiting. The blood contained parasites, but the cerebro-spinal fluid was normal. Six months afterwards, he complained of pains in his back and legs, and he limped with his left leg. There was no atrophy and sensation was not impaired, but the tendon reflexes of both upper and lower limbs were exaggerated. There was no change in his condition after two months treatment. [See this *Bulletin* Vol. 9, p. 303, & Vol. 12, p. 327.]

C. B.

Descomps (Paul) & Quercy. **Hémiplégie paludéenne. (Syndrome de Millard Gubler chez un paludéen récent: pas d'autre cause pathogène).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1920. Feb. Nos. 5, 6, & 7. pp. 255–257.

Left hemiplegia with paralysis of the right sixth nerve and paresis of the right fifth came on suddenly in the course of a benign tertian attack in a man aged 24 who had contracted ague in Macedonia ten months previously. He was otherwise quite healthy. After eight months, power had been regained almost completely in the limbs, but the condition of the cranial nerves remained unchanged. Examination of the cerebro-spinal fluid at this time was negative. The author refers to Léri's observations on malarial hemiplegia. [See this *Bulletin*, Vol. 12, p. 46.]

C. B.

Hebert (Pierre) & Bloch (Marcel). **Paludisme à masque de tétanie (accèspa lustres méconnus déclanchés par refroidissement).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1920. Feb. Nos. 5, 6, & 7. pp. 169–173.

A man aged 41, had been liable to attacks of tetany which came on in the course of almost all the minor ailments from which he had suffered during twenty years. In the summer of 1919 he visited Baku where he was much tormented by mosquitoes, but was in good health when he went to France in that September. Early in October a prolonged and very cold douche precipitated a benign tertian ague seizure. The initial rigor was of great severity and terminated in tetany which lasted for several hours. *P. vivax* was numerous in his blood. Under quinine and sodium cacodylate he recovered rapidly. Paresis of the left leg which had come on during the illness disappeared in a week.

C.B.

Vecchia (Enrico). **Un caso di orchite malarica.**—*Policlinico.* Sez. Prat. 1920. Jan. 5. Vol. 27. No. 1. pp. 6–9.

A boy of sixteen, a native of Trevlazer in Albania, had, on November 5th, 1919, a severe attack of malaria with intense rigors and grave general depression. About an hour after the onset of the attack, violent pain came on with swelling in the right testicle. With defervescence came relief of the pain and diminution of the swelling, to be succeeded by a fresh access of pain and swelling with the return of the fever. Endovenous injections of quinine brought about rapid decline of the fever and, *pari passu*, relief and finally disappearance of the testicular symptoms. There was complete absence of any evidence of gonorrhoea, parotitis, syphilis or tubercle.

F. S. A.

Acton (Hugh W.). **Researches on the Treatment of Benign Tertian Fever.**—*Lancet.* 1920. June 12. p. 1257–1261. With 1 graph in text.

The author estimates that 50 per cent. of malaria infections in India are caused by *P. vivax*. He concludes that the action of quinine is greater on *P. falciparum* than on *P. vivax*, and that by it, the former parasite is eliminated rapidly from the blood in mixed infections; hence it is that of 992 cases of ague relapses which were investigated at the Hill station of Dagshai, 978 were benign, and only 14 were subtertian infections. The patients came mostly from the Punjab where benign tertian ague prevails at the beginning of the hot weather, and the subtertian at its close. All the cases had been treated with quinine before their arrival at the Malaria Depot at Dagshai.

No. of relapses during weeks of treatment.									Number of relapses during weeks of after-treatment.														
Weeks . .	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	27
Relapses	–	1	4	6	7	12	19	53	139	248	199	89	82	43	25	26	7	6	4	2	1	2	1	1	1

Total benign tertian relapses 978.

Karl Pearson ascertained from an examination of the curve of these figures that the end point would occur in the 36th week approximately. That is to say that if the blood of a benign tertian case is negative after weekly examinations for nine months, recovery may be considered absolute.

Eight weeks should be the minimum period of observation, and in estimating the probability of relapses an additional 6 per cent. should be added as a correction on account of relapses which may occur after 8 weeks.

		Number of Cases.	Percentage of Cures.	Duration of Treatment.	Amount of Quinine in grains.
A.	Intravenous* and oral	100	18	8 weeks	48–678
B.	Intramuscular and oral	94	27·6	8 ,,	1284
C.	Oral alone 45 grs. for two successive days each week	90	18·8	8 ,,	720
	Oral alone 30 grs. for two successive days each week.	113	30	8 weeks	480
	Oral alone Ross and Thomson's continuous treatment for four months.	76	52·6	16 weeks	1,980
	Oral alone 30 grs, a day for ten days.	190	42·1	10 days	300

* Intravenous injections cause the parasites to disappear more rapidly than other methods of administration.

Out of 663 cases of benign tertian ague treated with quinine, nearly 70 per cent. relapsed.

In a group of 475 benign tertian cases which had been treated with quinine before their arrival at Dagshai, but not afterwards, 277 relapsed. Parasites were found in the blood of all. The 277 relapsed patients were put through a course of quinine, and were watched for two months afterwards. 204 relapses occurred among the 277. The 204 cases of relapse were treated with quinine, and during two months observation after the end of the treatment 145 relapses were noted. Similarly 95 out of these 145 relapsed after a second course, 76 of the 95 relapsed, 45 of the 76 relapsed after a third course, 32 of the 45 again relapsed, 10 of the 32 relapsed after a fourth course of quinine, and 8 of the 10 again relapsed. The percentage of cures for the four courses of quinine, are 28·9, 20, 28·28, and 20. The comparitive constancy of this rate of cure in the different courses of quinine treatment shows that there is little change in the resistance of the parasite or in the immunity of its host.

The quantity of cinchona bark required to yield 71 lbs. of quinine will give 100 lbs. of cinchona alkaloids which consist of

Crystalline alkaloids	Cinchonine	18·58 per cent
	Cinchonidine	5·84 ,,
	Quinine	7·4 ,,
	Quinidine	22·83 ,,
Non-crystalline alkaloids	" Quinoidine "	29·12 ,,
Water and ash		16·23 ,,

A group of 53 cases of benign tertian ague was treated with 21 grains of cinchona alkaloids daily in 3½ grain tablets by the mouth for 21 days. The percentage of cures was 50·9. A second group of 57 cases received this remedy for ten days only in like doses. The rate of cure was 52·8 per cent. The author states that the tablets are more pleasant to take and are less toxic than quinine, and that the combined alkaloids are more effective than quinine in the *P. vivax* infection. A three weeks course of cinchona alkaloids, costing 1*s.* 1*d.*, gives the same result as a four months course of quinine which costs 16 shillings and eight pence.

He estimates that the Government of India would save £22,000 annually if these alkaloids were substituted for quinine in the treatment of benign tertian ague.

Quinidine sulphate was given to 62 cases of benign tertian ague in doses of 10 grains twice a day for 21 days. The percentage of recoveries was 62·9. Similarly cinchonidine sulphate was administered to 46 cases, with a resulting cure rate of 63·1 per cent.

The amorphous alkaloids were quite ineffective in freeing the blood from parasites or in preventing relapses in a dozen cases of benign tertian malaria. The author concludes that the cure-rate of quinine

in benign tertian ague is . .	. .	20 per cent.
of cinchonine	. .	40 ,,
of cinchona febrifuge . .	. .	50 ,,
of cinchonidine and quinidine	. .	60 ,,

The laevo-rotatory alkaloids, quinine and hydroquinine, have a specific action on the *P. falciparum*, while the dextro-rotatory alkaloid quinidine is more powerful than quinine in its action on *P. vivax*. The corresponding laevo-rotatory isomeride cinchonidine behaves similarly in *P. vivax* infections. Both these isomerides are less toxic to man than quinine. The author's conclusions are :—The methoxy cinchonines, the quinine series, are less toxic than the cinchonine series. The hydro-alkaloids are more stable. The laevo-rotatory alkaloid quinine is a specific for *P. falciparum*, and the dextro-rotatory alkaloid quinidine is the best alkaloid for treating *P. vivax* infections.

C. B.

Nierenstein (M.). **The Chemo-Therapeutics of Quinine.** [Correspondence.]—*Lancet.* 1920. June 26. p. 1386.

Acton says that the laevo-rotatory alkaloid quinine is a specific for the *P. falciparum*, and its dextro-rotatory isomeride, quinidine, is the best alkaloid for combating the *P. vivax* infection.

If a 10 per cent. solution of quinine sulphate is heated for one or two hours it turns dark, and its specific rotation falls from −164° to −43°. This is due probably to the formation of quintoxin. If, however, a 10 per cent. solution is heated for the same length of time, and hydrogen or carbon dioxide is passed through the boiling fluid continuously, the solution does not change colour and remains free from quintoxin. It is possible that the quinine is partially isomerised to quinidine, and it is suggested that quinine thus treated may possess the therapeutic advantages indicated by Acton.

C. B.

HEHIR (P.). **Researches on the Treatment of Benign Tertian Fever.** [Correspondence.]—*Lancet.* 1920. June 26. pp. 1382–1383.

The number of subtertian cases investigated by ACTON is scarcely sufficient to justify definite conclusions concerning the relative curability of that infection by quinine compared with its less efficient action in benign tertian ague. The writer's experience shows that 75 per cent. of malaria cases in India are benign tertian, and not only 50 per cent. as estimated by ACTON. Nor is he satisfied that the combined alkaloids can take the place of quinine in the treatment of the latter infection. They were largely used a generation ago in the Medical College Hospital, Calcutta, where 100 ague patients would be treated every morning. In a fair proportion of them vomiting occurred immediately after swallowing the dose. C. B.

i. HEHIR (P.). **Treatment of Malaria by Quinine.**—*Indian Jl. Med. Res.* (Spec. Indian Sci. Congress Number, 1919). pp. 89–100.
ii. ——. **Remarks on Quinine Treatment of Malaria, etc.**—*Ibid.* pp. 233–234.

i. A Depot for the treatment of chronic malaria carriers among the British troops was opened at the hill station, Dagshai, in April 1918, and the Report embraces the period April to September 1918. The number treated rose from 450 in April to 690 in September. There were 103 controls.

Seventy three carriers were given 15 to 30 grains of quinine sulphate in solution by the mouth daily for 8 to 22 weeks. There were 34 relapses within 4 weeks.

Ninety three were treated with 30 grains daily for 3 weeks, followed by 15 grains a day for 90 days. Seven relapses occurred within 5 weeks.

Ninety one were given 30 grains daily for 8 weeks. Sixteen relapsed within 5 weeks.

In 101 cases quinine was given in solution by the mouth to the amount of 45 grains a day on two consecutive days weekly for 8 weeks. Thirty two relapses were recorded within 3 weeks.

In 110 the course was the same as the preceding except that the dose of quinine was 30 grains instead of 45. Only two relapses occurred.

Intravenous injection.—Twelve grains of quinine hydrochloride dissolved in 22 cc. normal saline fluid were injected into the veins of 5 carriers on 4 successive days. They all relapsed within 3 weeks.

In six the same treatment was adopted but it was followed by quinine sulphate by the mouth, 20 grains daily for a week, 15 grains daily in the second week, and 10 grains a day in the 3rd week. All these relapsed within 3 weeks.

Intravenous injections of 5 to 9 cc. of a 5 per cent. solution of quinine bi-hydrobromide in normal saline fluid were given to 8 patients on consecutive days ; 2 to 5 injections in all, followed by 20 grains of the sulphate by the mouth for the first week, 15 grains the second week, and 10 grains the third week. All relapsed in a period of 5 weeks.

A similar course of injections was employed in 72 cases but the after treatment with quinine by the mouth was 30 grains once a week for 2 months. Of these 23 relapsed during the course, and 24 within 4 weeks of the completion of the course.

Intravenous injections of 0·4 gramme of quinine hydrochloride and 0·2 gramme of urethane in 13 cc. of saline fluid were used in 4 cases. Four injections were given on successive days and were followed by the continuous oral after treatment detailed above. Three relapsed within 4 weeks from the end of the treatment. Of five patients who received a similar course of injections but in whom the oral after-treatment was interrupted, i.e., 30 grains once a week for 2 months, three relapsed within 2 weeks of the end of the course.

Intramuscular injections.—Twelve injections of 7 grains of the bi-hydrochloride dissolved in 20 minims of saline were administered intramuscularly every other day in 66 cases. Fifteen grains of quinine were given orally on the day of the injection and 30 grains on the days between the injections. Relapses were frequent. The oral administration was therefore increased to 30 grains a day for 28 days. Seventeen cases out of 50 subjected to this treatment relapsed within 3 weeks.

ii. India is not self-supporting in regard to its supply of cinchona bark. Javanese cinchona bark is purchased at a cheaper rate than it can be grown in India.

C. B.

Curjel (D. F.). **The Results of Treatment at the Malarial Convalescent Depôt, Dagshai.**—*Indian Jl. Med. Res.* (Spec. Indian Sci. Congress Number, 1919). pp. 101–104.

Although anophelines breed in the stone reservoirs for collecting water from springs at Dagshai they do not appear to enter the barracks which are situated a considerable distance away. There are breeding places for *A. turkhudi* and *A. lindsayi* 2,000 feet below Dagshai, and it is possible that *A. simlensis* may be found in the hollows of the Himalayan oak. In practice however, Dagshai is free from ague; reinfections do not occur there.

The blood examination of 472 of 841 ague cases transferred to the Malaria depot was positive. The *P. vivax* was found in 465, and the *P. falciparum* in 7 only. The blood was examined weekly during the treatment and for 8 weeks afterwards.

The majority of relapses occurred within the first 6 weeks after the end of the course. Only a very small number was noted after the 8th week. Hence 8 weeks observation is usually sufficient to establish the efficacy of the cure.

One hundred carriers were given 45 grains of quinine in solution by the mouth on two consecutive days a week for 8 weeks. Seventy seven relapsed. More than 30 grains of quinine orally a day was not well borne.

It was found at Dagshai that intramuscular and intravenous injections of quinine alone did not prevent relapses; hence oral treatment was combined with these injections. One hundred cases were treated with 12 intramuscular injections of 7 grains of quinine bi-hydrochloride given every third day, supplemented with 30 grains of quinine by the mouth on the alternate days, and after the end of the course of injections the oral quinine was continued daily for 4 weeks. Seventy-one relapses occurred but none during the treatment.

One to five intravenous injections of 5–12 grains of quinine bi-hydrochloride or bi-hydrobromide were given daily. In 5 cases

early relapses were noted; hence the intravenous medication was followed by the oral administration of 30 grains of quinine daily for 3 weeks or 30 grains once a week for 8 weeks. In 18 cases 81 per cent. of relapses occurred. No local or general ill-effects were observed as the result of intramuscular or intravenous injections.

A few cases were treated with cinchonine intramuscularly, with quinoidin orally, and with "Kinectine" a proprietary preparation containing quinine and arsenic. No advantage over the usual quinine salts was noted in their use.

A small group of cases appeared to be quinine resistant.

C. B.

Hehir (P.). **The Treatment of Malaria.** [Correspondence.]—*Brit. Med. Jl.* 1920. Mar. 27. p. 453.

During June and July 1919 in the Afghan campaign there were two exceptionally severe heat-waves. Hundreds of cases of hyperpyrexia with temperatures from 106° to 111° F. then occurred among the British Troops. Ten per cent. of these were associated with malaria, eight out of ten being *P. vivax* infections. It was the opinion of the officers who treated these patients that intravenous injections of quinine saved many lives. Hypodermic administration of quinine was discontinued in India, since numerous cases of tetanus were reported after these injections. Most of the medical officers who were serving in Mesopotamia up to the end of 1915, persevered in a long course of quinine after they had contracted ague. The writer acquired the benign tertian infection at Kurna in February 1915. He was treated with quinine in 20 grain doses daily for a fortnight, and ten grains daily afterwards. A relapse occurred. Thereupon he began again with a fortnight's course of 20 grains daily, and continued the after-treatment with reduced doses for five months without any recurrence. He points out how necessary it is to arrive at an accurate diagnosis. In July 1917 there was a sand-fly fever epidemic among the troops taking part in the Mahsud campaign. He himself was attacked and was treated with 45 grains of quinine for two days. Blood films which had been made but had not been examined for three days, were negative.

C. B.

Macfie (J. W. S.) & Fraser (M. W.). I. **Oral Administration of Quinine or Quinine and Arsenic for Short Periods to Young Native Children Infected with Malignant Tertian Malaria.**—*Ann. Trop. Med. & Parasit.* 1920. June 30. Vol. 14. No. 1. pp. 83–92.

Macfie (J.W.S.). II. **Oral Administration of Quinine Sulphate Grains 20 to Adult Natives Infected with Malignant Tertian Malaria.—III. Oral Administration of Quinine Sulphate Grains 10 daily for Two Consecutive Days only to Native School-boys Infected with Malignant Tertian Malaria.—IV. Oral Administration of Quinine Sulphate to Natives Infected with Quartan and Simple Tertian Malaria.**—*Ibid.* pp. 93–94: 95–110: 111–114.

I. The results of the Malaria Investigation of the Liverpool School of Tropical Medicine, 1917–1919, showed that in benign tertian ague the

percentage of relapses was similar after diverse methods of short treatment with quinine. Kindred observations on the subtertian infection were not then made, but it was found that intramuscular injections of 15 grains of quinine bihydrochloride on two successive days did not prevent relapses in every case. No better results were obtained when these injections were repeated on the 8th, 9th, 15th and 16th days, nor when they were supplemented by novarsenobillon intravenously and liquor arsenicalis orally.

At Accra, on the Gold Coast, in July and August, 1919, 10 grains quinine hydrochloride were given in solution daily to a group of 8 children aged six months to seven years, for two consecutive days in five, and for three, seven, and nine days respectively in the other three. All the infants appeared to be healthy, although asexual forms of the subtertian parasite were abundant in the blood of all of them. In five the plasmodia did not disappear, and in three the blood again became positive after a negative phase of a week or a fortnight. In another group, quinine sulphate in ten grain doses daily for 4, 6, 12 and 13 days respectively, was given to four infants of 4 months to 3 years, and in doses of $7\frac{1}{2}$ grains to another child aged 4, for 15 days. In one, rings persisted in the blood. In the other four, they disappeared in from 2 to 11 days, to reappear within 15 days in all except one, whose blood remained negative for 72 days. In a third group, 20 grains of quinine sulphate were given daily to four children aged 7 months to 3 years for 5, 9, 15, and 17 consecutive days respectively. In one case the asexual forms did not disappear, and in the rest they were found again within 12 days. The infant of seven months took 20 grains of quinine for 17 days, at the end of which parasites were as numerous as at the beginning. After 17 days an intramuscular injection of 3 grains of quinine bihydrochloride caused the blood to become negative next day, but there were parasitic relapses on 8–13th days and a febrile relapse on the 13th day after the injection. No vomiting or other ill-effects were caused by these enormous doses of quinine to this baby. In a fourth group, quinine hydrochloride grains 10 and liq. arsen. hydrochlor. minims 5 were given daily to 5 children aged 7 months to five years for 7 or 8 days. In two the subtertian rings did not disappear from the blood, in two they reappeared within a month. The remaining case was lost sight of 15 days after the end of treatment. All the cases had been treated previously with quinine alone without success. The addition of arsenic was no more beneficial. To a control group of 6 infants, all under a year, the blood of whom was negative, 10 grains of quinine hydrochloride were given on two consecutive days. None of them became infected during two months that they were under observation. Thus of 17 cases of subtertian infection 16 either did not become negative or had a parasitic relapse and 4 had a febrile relapse also. No bad effects from these relatively colossal doses of quinine to infants were noted, neither vomiting nor intestinal disturbance of any kind. Native children's blood may swarm with parasites for weeks together without a febrile paroxysm.

II. Twenty grain doses of quinine sulphate were given to 11 adults infected with subtertian ague, daily for 2 to 6 days. The asexual parasites disappeared in all in two days. Crescents were found in two on the 18th and 60th days respectively. There was no parasitic relapse in the rest for two months.

III. Ten grains of quinine sulphate for two consecutive days were given to 62 school boys aged five to eighteen. All of them appeared healthy although asexual subtertian parasites were present in their blood. The plasmodia disappeared in all in one or two days. Parasitic relapses were noted in 72 per cent. of those aged 5–8 within 60 days ; in about 69 per cent. of the 9–11 group ; in 89 per cent. of those aged 12–14 ; and in 64 per cent. of boys from 15–18 years. Only one febrile relapse was observed. During the period of observation subtertian parasites were found in three, and quartan in one of the 25 boys used as controls. The number of parasitic and febrile relapses was less numerous in the boys than in the infants, but more numerous than in the adults.

IV. Fifteen cases of quartan infection, aged 6 months to 65 years, were treated with 10 or 20 grains of quinine sulphate on two successive days ; one received 20 grains on 9 consecutive days. Asexual forms disappeared within three days in all. Six of the 15 had parasitic relapses. Two of the 3 children under 5 years of age relapsed within a month. The case treated for nine days relapsed.

Only 5 cases of *P. vivax* infection have been discovered at Accra. To three of these, ten grains of quinine sulphate were administered on two successive days. The parasites persisted during the 60–day period of observation in one of them, and recurred after 36 days in another ; the third remained free. Two cases were treated with 20 grain doses on 2 and 3 successive days. They had no relapse. In all except one the blood became negative within two days.

C. B.

Mühlens (P.). **Malariabehandlung mit kleinen Chinintagesdosen.** [Treatment of Malaria with Small Daily Doses of Quinine.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 6. pp. 173–174.

In Germany quinine costs nearly 7 marks a gram ; experiments were therefore made at Hamburg on the curative effects of small doses.

In relapses of benign tertian ague, daily intramuscular or intravenous injections of 0·1 gm. of quinine urethane speedily cut short the fever, and caused the disappearance of the parasites. Parasitic and febrile relapses were, however, not infrequent during the 6–weeks after-treatment. Daily doses of 0·25 gm. of quinine urethane into the muscles or veins, or 0·3 gm. of quinine hydrochloride orally on from 3 to 5 successive days, were effective in removing the parasites and fever in two to four days. During after-treatment with similar doses for three days at intervals of a week relapses were seldom observed. In many cases the cure was permanent. Intravenous or intramuscular injections of 0·5 to 1·0 gm. of quinine urethane were not attended with better results. Parasites disappeared within 2 or 3 days under 0·6 gm. of quinine hydrochloride by the mouth. Relapses were averted by using the same doses on 3 successive days with intervals of a week during 6 or 7 weeks. The results seemed to be as good as when 1–2 gm. daily doses of quinine were given, nor did any greater success attend the use of this amount combined with methylene blue and neosalvarsan.

In the discussion which ensued Nocht pointed out that the therapeutic results obtained in the treatment of relapses of ague occurring in Germany were not always applicable to fresh infections in a malarious country.

C. B.

Dawson (W. S.). **The Treatment of Malaria.**—*Brit. Med. Jl.*, 1920. May 1. pp. 600–601.

From the author's experience of many hundred cases of ague in East Africa, he advises the administration of 10 grains of quinine hydrochloride by the mouth every 3 hours as soon as possible, until tinnitus and deafness indicating absorption, occur, preceded by a dose of calomel. All food should be withheld until defervescence. If the quinine be vomited, it must be repeated orally once or twice if necessary. Subcutaneous and intramuscular injections are deprecated. In cerebral malaria and in uncontrollable vomiting high rectal and intravenous injections of quinine rarely fail. Arsenical preparations are useful in convalescence, and one or two injections of neo-salvarsan are beneficial in blackwater fever. Antimony preparations are valueless.

C. B.

Bateman (E. Noel). **Observations on the Diagnosis and Treatment of Malarial Fever.**—*Med. Jl. Australia.* 1920. Feb. 21. pp. 163–166.

Sixty per cent. of the Australian Light Horse contracted ague during the 1918 campaign in Palestine and Syria. Many were invalided to Australia. In the Jordan Valley 7 per cent. of apparently healthy troops were harbouring the malarial parasite. The subtertian infection was not always very severe, though it was the cause of the pernicious attacks. Haemorrhage from the stomach and intestines was a prominent symptom in a few cases, but there were not many instances of blackwater fever. The splenic dulness was often increased when the spleen was not palpable. The Wassermann reaction was positive during the ague paroxysm, but it became negative on the subsidence of the pyrexia. [Number of observations is not stated.]

For intramuscular injections a 6 per cent. solution of quinine bihydrochloride in physiological saline fluid was used. It is stated that solutions of greater strength are irritating and may cause abscesses.

"Quinine abscess was rare in the 14th Australian General Hospital. It begins with a brawny swelling round the site of the injection. Hot foments and complete rest in bed will generally abort it. Otherwise a fluctuating tumour forms, containing sterile chocolate-coloured fluid. Aspiration is much the best method of treatment and usually results in a cure in a week. Incision and drainage take 4 to 6 weeks in healing."

The injections were made into the buttocks 5 cm. below the iliac crest. For intravenous treatment 170 cc. of saline fluid containing 1·3 gm. of quinine bi-hydrochloride at a temperature of 48·5°C. were employed.

The author recommends the following intensive methods for all primary attacks both mild and severe, though he admits that the dosage appears excessive for non-pernicious seizures.

First, second and third days, quinine 1·3 gm. intramuscularly, and 1·0 gm. thrice daily by mouth. If the attack is unusually severe a second intramuscular injection of 1·3 gm. is given daily.

Fourth day and later, quinine 2·9 gm. orally every day for 3 weeks. If the spleen remains enlarged, three more intramuscular injections of 1·3 gm. each are given on successive days in addition. The course is completed by daily doses of 1·3 gm. by the mouth for 3 months. In cerebral cases 1·3 gm. was administered intravenously, followed in two hours by 1·3 gm. intramuscularly. The intramuscular injections were repeated every 3 hours till oral treatment was possible. There was no hesitation in giving 3·8 gm. of quinine intravenously in 12 hours in some cases. For chronic malaria 3 gm. of quinine orally daily with 3 intramuscular injections of 1·3 gm. a week until the spleen was normal were given. The dose was reduced to 2 gm. daily by the mouth after 4 weeks which was continued for 3 months. Galyl, eusol, X-rays were tried without success. Quinine rash was sometimes most troublesome. It was usually erythematous but occasionally urticarial, when oedema of the face and eyelids ensued. Amblyopia was rare and was temporary. [No statistics are given so no comparison with milder methods of cure can be made.]

C. B.

Rayson (H. Knights). **Mode of Quinine Administration.** [Correspondence.]—*Brit. Med. Jl.* 1920. Mar. 27. p. 454.

During three years at the Wynberg Hospital the writer had under his care a large number of malaria cases from German East Africa, and amongst them had seen instances of phlegmon and paralysis which were due to intramuscular injections of quinine. Such cases were very serious and protracted, and permanent deformities resulted from the loss of muscle and nerve tissue. During his last year at Wynberg he treated all ague attacks with hypodermic injections of quinine. Some hundreds of these were given. He admits, however, that small collections of pus which required evacuation occurred in 6 patients, but that the arms recovered within 10 days.

C. B.

Ruszkyak (Stefan). **Ueber Steigerung der Chininwirkung durch fluoreszierende Stoffe.** [The Heightening of the Action of Quinine by Fluorescent Substances.]—*Wien. Klin. Woch.* 1920. Jan. 1. Vol. 33. No. 1. pp. 6–8. With 5 text figs.

Certain observations by Marcacci and later by Tappeiner and others seemed to show that there is some relation between quinine and the action of light. The author surmised therefore that possibly fluorescent substances might heighten the action of quinine in malaria, and he experimented with sodium fluorescein and water-soluble eosin. Of 6,000–7,000 chronic malarial patients under treatment in Hungarian hospitals, only a small number were suitable subjects for experiment, namely, 17 who had fever in spite of a daily dose of 1–2 gm. quinine, and 19 others who repeatedly relapsed in spite of quinine treatment. The injections of fluorescein or eosin were given subcutaneously when it was evident that quinine was not controlling the disease, it having been previously ascertained that without quinine the therapeutic

effect was nil. The daily dose lay between 0·01 and 0·06 gm. and naturally the quinine medication was continued. The effect is shown in a series of charts. In a second series of cases the dose of quinine was such as just not to control the fever, usually 0·1 to 0·25 gm. The net result was that of 60 cases treated, the temperature came down promptly in all but twelve. The effect on later relapses could not be observed. [The type of malaria is not stated nor even that parasites were found.] The author realises that the possible fallacies are many, but he brings this short series of cases forward in the hope that others will make similar investigations.

Some experiments in vitro are described which show that the photodynamic action of quinine plus eosin is greater in proportion than in the case of either separately, and that the decomposition of haemoglobin by quinine is increased to a remarkable extent by the presence of eosin.

A. G. B.

Brau (P.) & Marque (J.-M.). **Paludisme à *Pl. falciparum* et Novarsénobenzol.**—*Bull. Soc. Path. Exot.* 1920, Mar. 10. Vol 13. No. 3. pp. 172–175.

A case of subtertian ague was treated with 9 injections of 1 to 2 gms. of quinine a day followed by large oral doses of quinine and 10 injections of arrhenal. Notwithstanding this intensive treatment, a relapse occurred eight weeks after admission, in which schizonts and crescents were numerous. Nine days later there were as many parasites as before in spite of several quinine injections. Five days afterwards 0·3 gm. of neosalvarsan was given intravenously. Next day the crescents were few. Injections of 0·45 and 0·6 gm. of neosalvarsan were repeated on the 5th and 12th days. Only one crescent was found in two films on the day after the last dose. The patient increased in weight and remained fever-free after the first injection.

In the second subtertian case, schizonts were numerous. Daily injections of 1·5 gm. of hydrochloride of quinine were given for 4 days, followed by a course of 10 injections of arrhenal. Three weeks later there were still many crescents in the blood. Three hypodermic injections of 0·5 to 1 gm. of quinine hydrochloride and 5 intravenous injections of colloidal quinine in the next 8 days failed to reduce the number of the parasites. Four intravenous injections of 0·3 to 0·75 gm., of novarsenobenzol, Billon, were then given at weekly intervals. The crescents became very few after the 3rd dose and disappeared after the last. The patient's health much improved.

The third was also a case of intractable subtertian ague harbouring many schizonts and crescents which resisted 5 hypodermic injections of 1 gm. of quinine, 4 intravenous injections of colloidal quinine and 10 subcutaneous injections of arrhenal. He received two intravenous doses of 0·3 and 0·45 gm. of novarsenobenzol after which he was lost sight of.

C. B.

Abrami (P.) & Senevet (G.). **Paludisme et novarsénobenzol.**—*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 264–268.

Doubts are expressed whether the favourable effects attributed to the use of neosalvarsan in the three cases of subtertian ague reported

by BRAU and MARQUE [above] were due to that compound. Subtertian infections in Macedonia, Algeria and elsewhere often regress during the winter (BRAU and MARQUE's observations were made in December) when crescents tend to disappear from the blood independently of treatment. Hence in every therapeutic research tests on controls are essential. In the literature of the influence of organic arsenical compounds on *P. falciparum* there is almost complete consensus of opinion that they cannot replace quinine, though they may be useful auxiliaries in some cases. They are, however, more effective in *P. vivax* infections. Ague undergoes spontaneous cure in a large proportion of attacks.

C. B.

ZANGGER (Theodore). **A Note on the Hydropathic Treatment of Malaria.**—*Lancet.* 1920. Apl. 3. pp. 766–767.

Eighteen cases of malaria contracted in Corsica and Algiers were treated with three "half" baths a week [see this *Bulletin*, Vol. 13, p. 296] after long courses of quinine [doses not stated], at Somvix, 4,264 feet above sea level, near Disentis, Grisons. In Corsica and France there had been 107 relapses a month [*sic*] during 140 days treatment. At Somvix under quinine for 60 days the attacks were 60 a month [*sic*]. During 35 days bath treatment only five relapses were noted. All the 18 patients, except one, remained free from ague for a year afterwards.

C. B.

CORDIER (Victor). **La radiothérapie de la rate paludéenne.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1920. Mar. 11. Vol. 36. No. 9. pp. 346–349.

As the result of two years experience in the treatment of intractable malaria with X-rays, the author concludes that they are of real service in some cases, although not a certain cure in all. His routine method of treating ague has been by means of quinine and salvarsan intravenously. Twenty-one of his patients whose infection was of more than six months duration, and who were anaemic and suffered from enlarged and painful spleen and frequent relapses, resisted the action of quinine and arsenical preparations and therefore were suitable cases. Each was subjected to three exposures at two days interval of 8 Bordier units (see *Presse Medicale*, 1919, p. 655) through a filter of 3 mm. of aluminium. The course of three exposures was repeated thrice after the lapse of 20 days. In two, the X-rays failed to benefit the symptoms, but in the remaining 19, great improvement was noted, although in 5 relapses came on from 3 to 7 months after the end of the course. Usually the spleen became smaller after the second series, and pain disappeared. The red corpuscles increased by half to one million. The leucocytes remained unaltered. Parasites could be found in few numbers during the relapse, never in the intervals. The general health improved. Two cases of malarial haemoglobinuria were cured. [See this *Bulletin*, Vol. 12, p. 59.]

C. B.

Haider (Leopold). **Einige Bemerkungen zur Frage der Mobilisation latenter Malaria.**—*Wien. Med. Woch.* 1920. Feb. 28. Vol. 70. No. 10. pp. 470–473.

Henszelmann recommended the administration of 0·1 to 0·5 gm. of benzol thrice daily as a provocative agent in latent ague [see this *Bulletin*, Vol. 14, p. 272]. Among the German and Austrian troops in the East, especially in Albania, the practice of taking benzol to precipitate an attack of ague and so to escape field service, was not uncommon. Haider tested the effects of benzol on 16 cases. In 7 in which the blood was free from parasites, no ague seizure supervened. In one patient there was a slight rise of temperature which was attributed to a disorder of the alimentary canal. In two, there had been ague attacks within a week of the benzol medication; in the other five the malaria had been latent two to five months. In nine cases in which the blood was positive, no rise of temperature above 0·5° C. followed the benzol, although the doses given were larger than Henszelmann's. In five of these nine the blood was negative after the benzol. One had an ague fit 14 days after its use. The author concludes that benzol in doses up to 12 gm. a day causes no characteristic pyrexia, or ague seizure, and that it is therefore useless as a provocative agent.

C. B.

Sheaf (E. W.). **Spontaneous Rupture of Malarial Spleen.** [Correspondence.]—*Brit. Med. Jl.* 1920. June 5. p. 767.

In Macedonia an English soldier after a long journey to hospital over rough roads was attacked with acute abdominal symptoms, which gave rise to the suspicion of perforated gastric ulcer, or appendicitis. Laparotomy was performed at once. The abdomen was full of blood coming from a small rent in the spleen which was six times the normal size, and adherent to the diaphragm. The spleen was excised. When the stitches were removed, the wound re-opened, but after re-closure, recovery proceeded uneventfully. He was apparently in extremis at the time of the operation, during which saline fluid was transfused. The open ether method of anaesthesia was employed.

The spleen of a Russian ruptured while he was sitting up in bed. Abdominal section was made. The stitches in the wound tore out and he finally succumbed.

C. B.

Skevington (J.). **Spontaneous Rupture of Malarial Spleen.** [Correspondence.]—*Brit. Med. Jl.* 1920. Apl. 24. p. 571.

A man aged 25 contracted ague while serving in Turkey in 1919, and had frequent relapses. While pushing a wheel-barrow he was suddenly attacked with violent pain in his back and abdomen. His pulse was soft and 124, respirations 42. The abdomen was rigid and and the pain intense in the left shoulder and behind the left scapula. A two and a half inch rent was found in the spleen from which blood was flowing freely, and there was much blood in the cavity of the peritoneum. Sutures failed to close the wound so the spleen was excised. It weighed 1 lb. 9 oz. There were fine adhesions in its upper

surface. He was discharged hospital recovered, 26 days after the operation. Subsequently he had two ague attacks in which the blood examination was positive.

C. B.

Raison (Cyril A.). **Ruptured Malarial Spleen: Splenectomy: Recovery.**—*Brit. Med. Jl.* 1920. June 19. p. 827.

A Macedonian aged 56, who had been subject to ague for many years, was kicked in the back by a donkey. He felt little the worse until five days later when he awoke with intense pain in his left side, which afterwards extended to his abdomen. He had repeated vomiting. When admitted to hospital on that day, he was collapsed, and complained of great abdominal pain, aggravated by movement and by coughing. His expression was anxious, his lips slightly cyanotic and pale. Pulse 145, respirations 44. There were no external signs of bruising. The abdominal wall was rigid and tender, especially in the left hypochondrium, where there was also fulness. Both flanks were dull on percussion, and the splenic dulness extended to the umbilicus. His knees were drawn up. Under local analgesia with half per cent. solution of novocain an exploratory incision into his abdomen was made. Blood filled the cavity. Morphia $\frac{3}{8}$ grain was injected and gas and oxygen anaesthesia induced. An oblique incision was made through the parietes. The spleen was removed with great difficulty on account of adhesions to the diaphragm. It was necessary to clamp the pedicle from the front. There was a rent four inches long in the anterior surface of the spleen which measured $13\frac{1}{2}$ x $6\frac{1}{2}$ inches and weighed 50 ounces. The blood, at first limited by the adhesions, had burrowed beneath the capsule which it burst in the end. Throughout the operation solution of glucose and sodium bicarbonate were injected into the veins. The abdominal cavity was irrigated with warm saline fluid some of which was left inside and the abdomen was closed. His condition was critical on the day of the operation, but he rallied 12 hours after it, when his pulse rate had fallen to 128. Ten grains of quinine were given every four hours. His temperature became normal on the tenth day after the operation. His blood count made a week after the laparotomy was.—Red corpuscles $3\frac{1}{2}$ million, white blood corpuscles 26,000, 67 per cent. of which were polynuclears, 11 per cent. small lymphocytes, 9 per cent. large lymphocytes, 9 per cent. hyalines, and 4 per cent. eosinophiles. Many of the red cells showed polychromatophilia. When he was seen 8 months later he was in the best of health.

C. B.

i. Blacklock (B.) & Carter (Henry F.). **The Experimental Infection in England of** *Anopheles plumbeus*, **Stephens, and** *Anopheles bifurcatus*, L., **with** *Plasmodium vivax*.—*Ann. Trop. Med. & Parasit.* 1920. Mar. 15. Vol. 13. No. 4. pp. 413–420.

ii. **Observations on** *Anopheles* (*Coelodiazesis*) *plumbeus*, **Stephens, with Special Reference to its Breeding-Places, Occurrence in the Liverpool District, and Possible Connection with the Spread of Malaria.** —*Ibid.* pp. 421–454. With 2 maps & 3 plates.

i. Of 17 laboratory bred *Anopheles plumbeus* fed on persons harbouring *P. vivax* the gut of 7 became infected, and in 4 of these the salivary

glands also were invaded. This salivary gland invasion was observed in 4 of 8 mosquitoes which were dissected after 10 or more days incubation at 28° C. from the time of the *P. vivax* meal. In the mosquitoes kept at room temperature, 17–26° C., the gut alone was infected. No human experiments on transmission were made as the authors consider that they were rendered superfluous by the work of MITZMAIN [see this *Bulletin* Vol. 9. p. 75], who found that a single mosquito carrying sporozoites in its salivary glands, infected a series of people by single bites.

Of 13 laboratory bred *A. bifurcatus* oocysts were found in the gut of only one after 10 days incubation at 28° C. following the infecting repast. In this case the maturity of the gametes in the person giving the blood, was tested by observing exflagellation before the mosquito was allowed to bite. The salivary glands escaped infection in all.

ii. *Anopheles plumbeus.*

Synonyms, *A. nigripes*, Staeger, *A. barianensis*, James; Length, 4–5 mm., dark colour, unspotted and densely scaled wings, palpi dark with the hair tuft on the last two segments in the male small, thorax not more than twice as long as wide; the middle of mesonotum is ashy grey with a central line of white scales in front, sides dark brown; legs very dark with pale spots at apices of femora and tibiae; abdomen blackish brown and hairy. Eggs, 0·5–0·6 mm. long, 0·2 mm. wide, fusiform with sharply tapering ends; a float of nearly uniform width completely surrounds the egg. Larvae, 5 mm. long when mature, almost black above, whitish below, long branched hairs on 1–6 abdominal segments, small hairs only on the head; clypeal hairs are simple; a few minute spines on the shaft of the antennae, and the basal hairs are very small; five pairs of palmate hairs on the back of the abdomen, and tufts of 3–7 setae on the sides of segments 1–7; the 9th segment is chitinised. In the pupa the abdominal hairs and spines are small.

This mosquito has been found in nearly all European countries. including Scandinavia and Italy, and also in the Western Himalayas [see this *Bulletin* Vol. 9, p. 80]. It has been captured in the suburbs of London, in Edinburgh, Paris, Grenoble, Bonn, and is not incommon within the four mile limit of Liverpool. They are essentially tree-hole breeders, and have been taken from the water in rot-holes of beech, birch, horse chestnut, elm, oak, sycamore, hornbeam and silver fir trees, from 2 to 20 feet above the ground. The breeding places may occur in more or less isolated trees situated sometimes within a few yards of houses, into which the adult insects occasionally enter. Near Shrewsbury the males have been seen swarming from July to October on the outskirts of a wood. *A. plumbeus* feeds on men both day and night. Its bite however may cause little or no discomfort to some people at any rate, and differs in this respect from that of the woodland mosquitoes *A. bifurcatus, Ochlerotatus nemorosus*, and *O. maculatus* the bites of which are more painful. In the rot-holes the larvae of *A. plumbeus* are frequently associated with those of the Aedine mosquito, *Ochlerotatus geniculatus*, and with the larvae of Chironomids and the rat-tail maggots of *Myiatropa florea* and *Helophilus pendulus*. The writers obtained larvae of *A. plumbeus* from tree-holes in December to February, and they ascertained that 35 out of 40 larvae survived freezing for 5 to 30 minutes.

C. B.

Abrami (P.) & Senevet (G.). **A propos des gamètes du *Plasmodium praecox*. Proportion variable des éléments mâles et femelles.**—*Bull. Soc. Path. Exot.* 1920. Mar. 10. Vol. 13. No. 3. pp. 167–172.

The sex of the crescents was determined by the classical characters—Male, Microgametocytes, chromatin scattered, pigment dispersed, protoplasm violet when stained by Giemsa. Female, Macrogametocytes, chromatin compact, pigment in a central mass, protoplasm blue. There were crescents of doubtful sex, generally under 5 per cent. of the total number counted. They made use of Ross and Stott's tables in determining the probable error of their results, and ascertained that the male crescents disappear from the blood more quickly than the female. Thus in one case with 1,500 crescents counted, the chances being 100 to 1 that the proportion of the females lay between 48·5 and 51·7 per cent., and of the males between 41·1 and 47·3 per cent. on the first day; nine days later the respective ratios were females 49·3 to 75·3 per cent., and 18·5 and 42·7 per cent. for the males, 85 crescents in all being counted.

C. B.

Craik (Robert). **A Note on the Erythrocytes in Malaria.**—*Lancet.* 1920. May 22. p. 1110.

The writer states that when lead salts are administered in health, after 3 to 7 days a few polychromatic, polychrome punctated, and basophile punctated red corpuscles are found in blood films. Polychromasia signifies premature birth of the corpuscle, but punctate basophilia indicates the effect of the lead. It is then possible to turn into the circulation marked erythrocytes. A grain and a quarter of lead acetate was given thrice a day to two benign tertian cases, in which less than one in five hundred of the red cells was infected. On the fourth day young rings were found in the polychrome and also in the basophile punctated red corpuscles. On the fifth day amoeboid and large pigmented forms as well as rings were seen in the basophile punctated discs. The life therefore of the basophile punctated erythrocyte is two days at least. On the other hand in the polychromatic and polychrome punctated red cells, none but young rings were discovered. Accordingly the polychrome red becomes a normal erythrocyte within twenty four hours, and a polychrome punctated disc becomes a basophile punctated red in that time. The proportion of young polychromatic red cells amounted to about 2 per 1,000 only. The parasites apparently preferred them.

C. B.

Kop (W. A.). **Een ongewone verandering in het geïnfecteerde roode bloedlichaampje bij Malaria tertiana.** [An Unusual Modification in the Infected Red Blood Corpuscles in Tertian Malaria.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1919. Vol. 59. No. 4. pp. 592–595. With 1 plate.

An account of a case of tertian malaria in a European girl in which the red corpuscles, with half an hour's staining, shewed in addition to rings resembling *P. falciparum* rings, typical Maurer's dots with some

P. vivax gametes, thus suggesting a mixed subtertian and tertian infection. More prolonged staining, however, brought out a clearly defined Schüffner's stippling and the gametes and the half grown schizonts found next day proved the case to be a benign tertian infection.

F. S. A.

Schilling (Viktor). **Morphologische Blutuntersuchungen in der Diagnostik der Malaria tertiana.** [Blood Examination in a Diagnosis of Tertian Malaria.]—*Deut. Arch. f. Klin. Med.* 1919. Aug. 15. Vol. 130. Nos. 1–2. pp. 21–26.

Exception is taken to the views of Klieneberger with regard to the nature of basophile stippling of the erythrocytes in malaria, Schüffner's dots, and mononuclear increase. No new observations are recorded.

C. B.

Gutiérrez Igaravidez (P.). **Teñido rápido de muestras de sangre para la invetigacion de plasmodias de laveran.** [Rapid Staining Technic for Malaria Plasmodium.]—*Bull. Porto Rico Med. Assoc.* San Juan. 1920. Mar. Vol. 14. No. 125. pp. 1–5.

One per cent. solutions of methylene blue, and eosin in methyl alcohol are prepared and preserved in dark coloured bottles. Immediately before use equal quantities of the solutions and of methyl alcohol are mixed; ten to fifteen drops are poured on the blood film which has been dried in air; twenty to thirty drops of neutral water are added. After a minute and a half wash with water and dry with blotting paper. To test the reaction of the water, add a little powdered haemotoxylin; a yellow tint denotes acidity, a deep violet alkalinity.

C. B.

Arai (K.). [**On the Prognosis of Malaria.**]—*Taiwan Igakkai Zasshi (Jl. of the Formosa Medical Soc.).* 1920. Feb. 8. Nos. 206–7. pp. 53–56.

The author calls attention to the fact that with the patient in whose case the administration of quinine has been delayed, the utmost care should be taken although convalescence seems to be proceeding satisfactorily. The method recently introduced in a French army in Macedonia which is to inject hypodermically a dilute solution of quinine hydrochloride and antipyrine is most successfully used in such a case.

H. Ohshima.

Furuichi (T.). [**Gastric Juice of Malarial Patients.**]—*Taiwan Igakkai Zasshi (Jl. of the Formosa Med. Soc.).* 1920. Feb. 8. Nos. 206–7. pp. 57–69.

Gastric juice was obtained after a test meal from the patients who had not yet been treated with quinine. The quantity of the juice, its general acidity and the percentage of free hydrochloric acid were found small, especially so in malignant ague. Lactic acid was proved to be present in a majority of cases. As convalescence proceeds the gastric juice returns to its normal condition. In malignant ague the

low acidity was met with even at the stage when no other malarial symptoms were evident except the presence of the crescents in blood. In a few cases of blackwater fever which came under the observation of the author, a similar feature of lowered acidity could also be found. [See Weinberg, this *Bulletin*, Vol. 15, p. 403.—Ed.]

H. Ohshima.

Yoshida (T.) & Kô (K.). [**On the Blood Sugar of Malaria Patients. (2nd comm.)**]—*Taiwan Igakkai Zasshi (Jl. of the Formosa Med. Soc.)*. 1920. Feb. 8. Nos. 206–7. pp. 70–71.

In a previous paper the authors reported that in the apyretic period the amount of sugar in the blood was found to be within normal limits, i.e., 0·09 per cent. in tertian, 0·082 per cent. in quartan, and 0·093 per cent. in malignant ague, on the average.

The present paper gives further results in connection with the period of fever. The amount of sugar reaches the maximum, i.e., 0·122–0·158 per cent., during the pyrexia. The average figure in this period shows 0·117 per cent. in tertian and 0·125 per cent. in malignant ague. In a case of blackwater fever it was found to be as much as 0·133 per cent.

H. Ohshima.

Terburgh (J. T.). **Malaria-bestrijding bij de Inlandsche bevolking door middel van chininisatie.** [Quininisation as an Expedient in the Fight against the Malaria among the Native Population.] —*Meded. Burgerlijk Geneesk. Dienst. in Nederl.-Indië*. 1919. Pt. 9. pp. 72–139. With 3 plates.

The author was called upon to deal with outbreaks of ague among communities of between 11,000 and 24,000 souls during the years 1907 and onwards. The only European assistants which he had were two Salvation Army Officers who were the certifiers and registrars of the deaths; hence the statistics can be taken no more seriously than those of the deaths from "fever" among the civil population, which appear in the Annual Reports of the Sanitary Commissioner with the Government of India. The latter are compiled from the returns of the village watchman who is the person responsible for reporting deaths and their causes. The prophylactic treatment adopted was the administration of 0·6 gm. of quinine in tablet form on two successive days a week. At first this was a compulsory measure, but it was soon dropped on account of the opposition which it aroused, after which, in the words of the writer quinine prophylaxis became an absolute fiasco.

C. B.

Sewell (E. P.) & MacGregor (A. S. M.). **An Anti-Malaria Campaign in Palestine. An Account of the Preventive Measures Undertaken in the 21st Corps Area in 1918.**—*Jl. Roy. Army Med. Corps*. 1920. Feb., Mar. Vol. 34. Nos. 2, 3. pp. 85–100. With 2 plates, 2 charts in text & 1 map; 204–218. With 1 chart in text.

After the capture of Gaza on November 7th, 1917, the 21st Corps halted at a line running S. E. from 3 miles above Arsuf on the coast to the source of the river Auja, thence E. to Berukin. It occupied an

area of about 250 miles square for the most part waterless. The breeding places of mosquitoes were the river Auja and its tributaries, the Burak Leil, Bahret Katurieh, and Abu Zeitun marshes, wells and cisterns for irrigating the orange groves. The Auja valley is highly malarious, so much so that the Jewish colony at Petah Tikwah near Mulebbis, which was founded 40 years ago, was abandoned. The natives leave the low-lying parts in the spring, as they have learnt by experience that staying there during the summer is deadly. The Auja is a perennial stream 15 miles long which rises at Ras el Ain, in swamps and acres of dense jungle of grass, brambles, thistles, and reeds concealing innumerable springs and pools, and also shell-holes filled with water. The banks of Auja, steep in places were overgrown with willows, canes, bananas and reeds, so dense that in parts it was impossible to reach the water's edge. Several rivulets flow into the Auja, consisting of stagnant pools and swamps overgrown with vegetation, impenetrable in places. The scrub was cut down, the marshes were drained, the banks were trimmed and the reeds removed by the end of July 1918. The Burak Leil marsh, about three quarters of a square mile in area, and a foot deep, was overgrown with weeds. There were no fish in it but many tadpoles. About 5 million gallons of water were pumped out in the middle of May. The reeds were cut and the marsh was dry by the end of the month.

The Bahret Katurieh marsh, about 155 acres in extent, and two feet deep, was drained by clearing and deepening an old tunnel which was discovered perforating the lime stone ridge which separates it from the sea. The marsh was not dry until July 13; hence many mosquitoes had already hatched out.

The Abu Zeitun marsh, 2 miles long by ½ a mile wide, consisting of shallow pools and rush-covered swamps was drained by the middle of June. The work was one of great difficulty on account of the water-logged nature of the soil, 8,500 cubic yards of which were excavated and 20 acres of reeds cut down. The cost of these anti-malaria operations amounted to over £70,000, and entailed about a quarter of a million man-days labour. The expense was justified, for anopheline breeding began in the open early in April, and had it remained uncontrolled it is probable that our forces would have been so reduced in number by ague that we should not have been able to make our victorious advance in September, 1918.

Blood films were made of every febrile case before giving quinine, and sent to the Malaria Diagnosis Station. During the winter 1917–1918, an outbreak of subtertian ague occurred among the troops billeted near wells, 108 out of 550 of which were then breeding *A. bifurcatus.*

Among the troops in 1918, the strength of whom varied from 60,000 in May, to 80,000 in September, the weekly incidence of malaria rose from 0·55 per 1,000 in May, to 10·29 per 1,000 in the middle of August, falling to between 6 and 7 per 1,000 in September. The total number of cases of ague in 21 weeks was 7,270; 5,306 of which were fresh infections caused in the majority of instances by mosquitoes hatched out before the streams and swamps were brought under control; 890 were subtertian and 6,159 were benign tertian infections.

The larvae in cisterns and wells were destroyed by applying half an ounce of kerosene oil for each square yard of surface with a Vermorel

sprayer every ten days. Mosquito nets to fit inside bivouac sheets, one for two men, did not arrive until after the beginning of the mosquito season. The mean maximum weekly temperature of 80°–94° F. during the summer months was against their use. Ointments containing oil of cassia 1 part, oil of camphor 2, and vaseline 3 parts were efficient in warding off mosquitoes, but not sand-flies, for about five hours. Oxford grease was unsuitable. Vermijelli is repellent to both mosquitoes and sand-flies. Quinine prophylaxis was not adopted.

Anti-malaria work ceased on September 19, 1918, and 20 days later anopheline larvae were again abundant at the source of the Aujá.*

C. B

Janssen (Dr.). **La lutte contre la malaria au Pays-Bas.**—*Caducée* 1920. Mar. 15. Vol. 20. No. 6. p. 80.

After draining the Lake of Haarlem in the year 1852 there was a severe epidemic of ague in Holland which extended to France and Germany. Unless precautions are taken the same event may follow the reclamation works now in progress on the Zuider Zee. Of recent years ague has become more prevalent in Northern Holland. At Alkmaar, a town of 25,000 inhabitants, no less than 260 lbs. of quinine were used in 1919. Amsterdam however is almost free from malaria. In Holland the anophelines hibernate chiefly in stables, pig-styes, and hutches. In some stables several hundred grammes of these mosquitoes have been collected. Cow-sheds are not such favorite haunts. A special commission is now undertaking anti-malarial measures.

C. B.

Paoletti (Ferdinando). **Osservazioni sull' impiego del chinino a scopo profilattico nella malaria. (Note e Contributi).** [Notes on the Use of Quinine as a Prophylactic in Malaria.]—*Policlinico.* Sez. Prat. 1919. Dec. 7. Vol. 26. No. 49. pp. 1458–1460.

The author, who was stationed in Albania during the malarial seasons of 1917 and 1918, describes a large scale experiment with quinine as a prophylactic carried out on soldiers under his medical charge. Each soldier was given, commencing in March 1917, ·4 gramme daily. In May cases of malaria began to be frequent among the men and the number steadily increased as time went on. "Observations," states the author, "carried out during the whole of the epidemic season of 1917 left me completely disillusioned concerning the results of quinine prophylaxis. With the rarest exceptions the men treated contracted malaria and, a point worthy of mention, this was true of the men who had come from healthy parts of Italy and had never suffered before." In contrast the author quotes the experience of the hospital medical staff of seven. These took quinine but, in addition, they were housed in quarters efficiently protected against the entry of mosquitoes. Only one of the number, the Director, contracted malaria and he stated that he had been bitten by a mosquito one evening while outside his quarters.

F. S. A.

* For a similar account see Austen, this *Bulletin*, Vol. 15, p. 265.

Ratto (Lorenzo). **La Stazione anti-anofelica di Fiumicino.**—*Malariologia.* 1919. Oct. 31. Series 1. Vol. 12. (Series 2. Vol. 5.) No. 4–5. pp. 83–86.

A concise account of the founding under Prof. Grassi with Government aid, of an anti-malarial station at Fiumicino, an extremely malarial district on the seaward side of the Agro Romano or Campagna ; of the ends aimed at, the methods adopted and the results so far achieved. Complete disanophelisation being impossible owing to the extremely numerous drainage canals, the problem is being attacked from the other side and the attempt is being made to arrive at a condition of "anophelism without malaria" by the active treatment of all malarial subjects and the regulation or prohibition of the immigration of such into the district. Inasmuch too as the female anopheles has a preference for the pig over the human subject, encouragement is offered to the rearing of pigs in sties separated by some distance from human habitations. The author states that at the time he wrote in 1919—(date not given)—no primary case of malaria had occurred in that year at Fiumicino and that the number of relapses shewed a marked diminution on those of the corresponding period of 1918.

F. S. A.

Gioseffi (M.). **Per la lotta contro la malaria in Istria. (Contributo alla conoscenza delle condizioni igienico-sociali dell'Istria).** [The Fight against Malaria in Istria.]—*Riforma Medica.* 1919. Aug. 9. Vol. 35. No. 32. pp. 671–675.

In districts where dysentery and enteric as well as malaria prevail, mistakes in diagnosis are easily made without laboratory investigations. Two instances are given in which typhoid epidemics occurring in a malarial zone were too readily diagnosed as malaria and one in which the same mistake was made in respect of an epidemic with dysenteriform symptoms which, at first regarded as malarial, turned out to be a true Shiga-Kruse bacillary dysentery.

As regards malarial parasite carriers the author states that in 1917 and 1918, in Istria, he found that among patients coming under his treatment for miscellaneous non-malarial ailments, about 10 per cent. had parasites in their blood. Systematic treatment by quinine of all persons found infected is urgently enjoined. The author alludes to the habit among Istrians of bartering their government quinine for fats and nitrogenous foods as necessitating special vigilance. The need is often felt, states the author, for hospitals for the reception of patients refractory to treatment, especially of quinine-resistant cases. An urgent plea is made for the provision of anti-malarial instruction on compulsory lines in all primary, normal, agricultural and secondary schools in malarial zones. A heavy indictment is brought against the former Austrian government of Istria, under which the population existed in conditions of extreme poverty, squalor and illiteracy, one natural consequence of which was a high crime rate and another an extreme prevalence of alcoholism, tuberculosis and malaria. Government quinine is provided free in all malarial zones in Italy. In the author's opinion the plan has not worked well, having led to the abuse rather than the use of quinine.

That malaria existed, and in the graver forms, in Trieste as long ago as 1827 appears from a small work by Drs. Frussick and De Moulon. In the writer's opinion not much is to be expected from drainage on the large scale. The suppression or petrolisation of all small collections of stagnant water and the clearing of the *macchia*—a kind of jungle of low bushes which covers large areas of Southern Istria as it does much of the coastal lands of Corsica—and the cultivation of the cleared areas, are likely to be more fruitful measures.

F. S. A.

Bass (C. C.). **Studies on Malaria Control. xi. Control of Malaria by Quinine Sterilization of the Human Host.**—*Southern Med. Jl.* 1920. Apr. Vol. 13. No. 4. pp. 250–256. With 1 chart in text.

The author gives a short account of the anti-malaria work undertaken in Bolivar. [See this *Bulletin* Vol. 15, pp. 134 ; 135.] In order to make an experiment under conditions similar to those which prevail in the malarious parts of the Delta of the Mississippi, an area of 100 square miles in the adjoining county of Sunflower was selected, containing a rural population of about 9,000. The malaria carriers were discovered and were treated with the standard doses of quinine for 8 weeks free of cost [*loc. cit.* p. 412]. The incidence of ague dropped from 40·22 per cent. in the year before the control began to 4·06 per cent. during the 12 months after its commencement. In the discussion which followed, J. C. Geiger stated that no parasites were found in the blood of 90 carriers who had taken 10 grains of quinine daily for 30 days. Bass also remarked that he knew of three relapses only among carriers who were going through the standard course of quinine in a population of about 50,000.

C. B.

Bass (C. C.). **Studies on Malaria Control. The Frequency of Malaria Relapse in an Area of Great Prevalence in the Mississippi Delta.**—Reprinted from: *Contributions to Medical & Biological Research, dedicated to Sir William Osler, in Honour of His Seventieth Birthday, 1919, July 12, by his Pupils and Co-Workers.*

This study was made of 100 square miles in the central portion of Sunflower County, Mississippi. The area is typical of the delta of this river. The rich alluvial soil is poorly drained. The uncleared areas are covered with dense forests of oak, ash, and gum, with thick undergrowth of scrub in many places. The population averages 90 per square mile, 17·8 per cent. of which are whites. The main industry is cotton-growing, carried on by the "negro and mule" method. Out of 7,089 inhabitants, 41·33 per cent. gave a history of one or more attacks of ague during the previous twelve months. Of those who gave a negative history 18·78 per cent. harboured parasites. From the end of June to the middle of October 1918, 3,815 persons were examined. Of these 1,407 had attacks of ague in 1917, 37·88 per cent. of whom were again seized in 1918. Of the 2,408 persons who gave negative histories for 1917, only 10 per cent. were attacked in 1918. From a consideration of these facts and the probable proportion of

carriers among those who gave no history of ague, the author concludes that between 28 and 38 per cent. of all persons who have suffered from ague during a given year will relapse next year; and that from 51 to 69 per cent. of such attacks are relapses and not new infections.

C. B.

Taylor (H. A.). **Malaria Control through the Application of Anti-Mosquito Measures and some of the Results obtained in South-East Arkansas.**—*Southern Med. Jl.* 1920. May. Vol. 13. No. 5. pp. 339–344. With 4 charts in text.

The zone of control extended as far as three quarters of a mile beyond the limits of the towns of Lake Village, Dermott, Monticello, and Bauxite in south east Arkansas, and covered an area of 12 square miles, and included a population of 9,980. All streams were regraded and cleared; narrow ditches were cut at the bottom of the wide ditches and elsewhere. For oiling, drip cans were soon discarded in favour of Meyes' knap-sack pump sprayers. Spraying was done once a week, and on the score of economy was limited to those collections of water in which full-grown larvae and pupae were present. It was forbidden to store water in cisterns, etc., where the town supply was available. The operations began on April 1st 1918, and by the end of May there was almost complete absence of mosquitoes. The ague-rate was reduced about 73 per cent. at a cost of $0·84 per head.

H. R. Carter stated that if the time from the egg to the imago is 16 days, there is no need for oiling until the larvae are reaching maturity. It by no means follows that all larvae reach this stage. His experiments with Stegomyia on the Isthmus showed that only a small proportion of larvae developed into mosquitoes.

C. B.

Howard (H. H.). **Malaria Control in Rural Communities by Anti-Mosquito Measures.**—*Southern Med. Jl.*, 1920. Apr. Vol. 13. No. 4. pp. 260–266.

An area of 36 square miles in Hinds County, Mississippi with a population of 830 was selected for a fish control experiment. Two hundred and twenty eight collections of water, of which only 61 did not breed anophelines, were kept under observation. *A. punctipennis* was most numerous, and was the only domestic anopheline. *A. quadrimaculatus* was found in the larger ponds and natural streams. Larvae were discovered in protected places up to February.

The top minnow, *Gambusia affinis*, is a hardy and adaptable fish, plentiful locally in the ponds and rivers. It is prolific. A female may produce 240 fry during the summer. These fish were distributed to the water collections which did not already contain them. Ninety per cent. of mosquito breeding places were thus controlled, and there has resulted an immediate and great reduction in these insects. Top minnows are effective in the presence of debris and vegetation which render oiling useless. The cost has amounted to $4·10 per head. The incidence of ague has declined from about 16 per cent. before, to about 4 per cent. after the minnow control.

H. W. VAN HOVENBERG said that in the streams of East Texas, three feet or more in depth, the minnows are efficient, but in the smaller streams the rapidity of the weed growth requires the use of oil. In an area of 2 acres of watercress however, in Dallas, Texas, the fish control was successful.

J. A. LE PRINCE stated that in Norfolk, Virginia, the water supply is obtained from a series of lakes, and there was much ague in the neighbourhood which was suppressed by using the inlets of the lake for hatching and feeding Gambusia. Fish hatcheries have been established at Augusta and Georgia, and Montgomery, Raleigh, North Carolina and Atlanta.

C. B.

FERRELL (John A.). **Results of Recent Efforts to Control Malaria.**—*Southern Med. Jl.*, 1920. Apr. Vol. 13. No. 4. pp. 256–260.

The malaria control of rice fields in Arkansas and California is being undertaken, the report of which will be published. A small experiment on screening was made in Arkansas. Ague was reduced about 70 per cent. and the cost per head amounted to about $1·75. The repair of the screens was frequently neglected. The author refers to BASS's and HOWARD's experiments summarised in this *Bulletin*, and goes on to relate TAYLOR's results of malaria control in densely populated communities by mosquito prevention, and of CARTER's at Roanoke Rapids [see this *Bulletin* Vol. 15, p. 94]. It is believed that during this year control operations will extend to 60 or 70 Southern communities, entailing a cost of $400,000 or $500,000. In the table in which are given the results of preventive work 1913–1918, it is seen that the cost per head has varied from $0·24 to $1·45 and the probable percentage reduction in ague has varied from 72 to 97.

In the discussion which ensued, C. E. LOWE stated that the commercial world now recognises the financial value of disease prevention. The Southern Settlement and Development Company is taking active measures in malaria propaganda and control. BASS said that there is a company about to manufacture quinine in Brazil where some 75 different species of trees are stated to yield considerable quantities.

CARTER remarked that quinine cannot be made synthetically. Trees must be 13 years old before they are barked.

C. B.

FREEBORN (S. B.). **The Business of Malaria Control.**—*Mthly. Bull. California State Bd. Health*, Sacramento. 1920. Jan. Vol. 15. No. 7. pp. 217–220. [Summarised in *Rev. Applied Entom.* 1920. May. Vol. 8. Ser. B. Pt. 5. p. 93.]

Taxation under the Mosquito Abatement District Act brings in four pence halfpenny only per acre, and the expenditure costs £10 per acre. Ague stricken communities therefore should receive State aid.

C. B.

Discussion on Quinine and its Related Alkaloids in Pharmacology and Therapeutics.—*Brit. Med. Jl.* 1920. July 24. pp. 113–117.

This discussion was opened by Professor W. E. DIXON who referred to the chemistry of quinine and of its derivatives, the action of " quinine

alkaloids" on protozoa and on ferments, local anaesthetic action, action on metabolism and on bacteria with special reference to ethylhydrocupreine and the pneumococcus, absorption and excretion and (shortly) methods of administration. The paper is a comprehensive and interesting one which could not well be summarised. The author writes, "What is required in medicine is not a super-quinine but a quinine with more specialised selective actions on certain organisms."

Professor RAMSDEN of the University of Liverpool gave an account of the work carried out by LIPKIN, WHITLEY and himself. LIPKIN has confirmed their previous result that the concentration of quinine in the red blood corpuscles is about one third of that in the surrounding serum, a finding contrary to that of MORGENROTH [this *Bulletin*, Vol. 13, p. 81]. He and his colleagues differ from NIERENSTEIN as to the association of albuminuria with a certain concentration of quinine in the urine; they have found albuminuria only in blackwater fever He writes:—

"It is an important, and still an open, question whether the malarial parasite is damaged at all by quinine itself in such concentrations as are attainable in the blood, or whether the damage which it suffers during quinine medication is not due to some metabolite of quinine produced only in those tissues (liver, gut, kidney and muscle), known to destroy quinine—possibly to a fugitive aldehyde R. CHO intermediate between the ingested drug and quitenine."

Major ACTON's contribution to the discussion contains much unpublished work. He gives an account of the history of cinchona cultivation in India; and it appears that as long ago as 1866 a Committee in India tested cinchonine, cinchonidine, and quinidine in clinical malaria and found that "all three alkaloids exerted an immediate curative effect," but no notice was taken of this work, and quinine continued to monopolize attention. A table shows that among 302 men undergoing a course of continuous quinine for benign tertian, there were no relapses in the course of the treatment (which in 190 cases lasted 3 weeks) whereas among 261 men who received it on two consecutive days each week, 21 relapsed during treatment (lasting 8 weeks.) The conclusion is drawn that "a continuous treatment is the only sound way to administer these alkaloids." Natural cure of malaria is brought about by the excessive multiplication of gametocytes with exhaustion of the asexual cycle; the parasite and host thus maintain an equilibrium for their mutual benefit. Artificial cure takes place in three stages: (1) The parasitic concentration is reduced from febrile to afebrile limits. (2) Sterilization is brought about by complete destruction of the asexual cycle. Major ACTON calculates from a formula that the rate of destruction in malignant tertian, to effect a cure, must be 92 per cent., but that in benign tertian owing to the more rapid multiplication it must reach 95 per cent. For the same reason the duration of treatment in benign tertian must be longer. (3) The asexual forms which have escaped destruction become gametocytes, the multiplication rate is retarded and this accounts for late relapses and latency as well as spontaneous cure. That there is a high percentage of gametocytes in relapse after quinine treatment is supported by a table.

ACTON's experience at Dagshai led him to conclude that quinine cures malignant tertian, but that 75 per cent. of the benign tertians relapse. He therefore tried cinchona febrifuge and found it superior

to quinine. Following up this result, and after eliminating the amorphous alkaloids and cinchonine, cinchonidine and quinidine were tested, and in a trial series these gave a cure rate of 60 per cent. after 3 weeks treatment. It appears that Howard's quinine is often adulterated with quinidine in India. He recommends hydroquinine for malignant tertian and quinidine for benign tertian, preferably by the mouth, 10 grains twice a day, for one month in subtertian, and two months in benign tertian. The use of quinidine means greater efficiency and economy, and "for the amount of quinine extracted from Indian barks five times that amount of quinidine could be obtained yearly," so that India could supply the whole of the British Empire.

Dr. C. M. Wenyon remarked that in his observations the good results obtained with intramuscular quinine quite outweighed any ill effects from necrosis, and in reply to a doubter of the value of prophylactic quinine stated that in the Caucasus 305 men were exposed for four weeks to infection without nets or quinine and within 2 months 303 men had gone down with malaria, a result which he deemed inconceivable if quinine had been taken.

A. G. B.

Nierenstein (M.). **Report on the Excretion of Quinine in the Urine.**—*War Office Observations on Malaria by Medical Officers of the Army and Others.* 1919. Dec. pp. 4–79. With 1 text-fig. (Published by H.M. Stationery Office.)

The general conclusions of this paper, in which is packed information on the relative value of all hitherto reported qualitative and quantitative tests for quinine, include the following points of interest to the non-chemical tropical worker :—

The qualitative tests found most trustworthy were, the Mayer-Tanret and the Herapath test (discovered in 1853 at Bristol), the latter being preferred ; for clinical routine examinations Baur and Reveillet's picric acid method is advised.

Of quantitative methods preference is given to Barratt & Yorke's modification of Giemsa and Schaumann's method.

As a result of 1,668 estimations of urines collected from 86 cases of proved malaria it was found that the excretion of quinine showed marked individual and daily differences (24 pages of tables) ; that the channel of administration of the bi-hydrochloride made no appreciable difference in the excretion, nor did it signify which of five salts or the free alkaloid was employed orally ; that the metabolised quinine is in proportion to the dose given ; that there was a tendency for the quinine to reach a concentration of 7 to 11 grs. quinine base per litre of secreted urine, and doses producing a higher concentration frequently caused albuminuria ; that the excreted quinine is unchanged quinine, and that a disintegration product, quitinine, was found during the early stages of excretion ; and that a disintegration product with haemolytic properties, termed provisionally haemoquinic acid, was found in the urines of 12 out of 13 blackwater fever cases and also in malarial urines after quinine, but only in the ratio of 1 : 578 parts in the blackwater series. [It is safe to say that Dr. Nierenstein's paper is of permanent value.]

A. G. B.

Hooper (F. W.). **Quinine Tabellae and Quinine Salts.**—*Jl. Roy. Nav. Med. Serv.* 1920. Jan. Vol. 6. No. 1. pp. 15–18.

A report having been received from the East African station that the quinine supplied to H.M. ships was irregular in action, samples to the number of 21 were sent home for examination. Of these, 2 only were in any way satisfactory and these had been supplied through the normal service channels. The tabellae, 16 samples, were examined on the following points :—Disintegration (1) in water ; (2) In acidulated water at blood heat ; (3) Nature of the acid radicle ; (4) Amount of quinine present as anhydrous alkaloid ; (5) Purity of the alkaloid.

With regard to (1) while some of the tabellae disintegrated completely in a few seconds, others were intact after several hours. Complete solubility, it is noted, is not to be expected because many of the tabellae contain starch to ensure disintegration. In some cases cinchona alkaloids other than quinine were found, and this was especially the case in one specimen which had been considered more potent than the rest. The amount of quinine found on analysis frequently did not correspond even approximately with the label.

With regard to the loose way in which the words quinine is used it is noted that 10 grains of quinine alkaloid are contained in 10·49 grains of quinine bihydrochloride, but only in 14·49 of the bisulphate, and that these quantities are equivalent in their therapeutic effects. The bihydrochloride, as found in commerce, is practically anhydrous ; the author recommends that this salt should replace the bisulphate in the Service Afloat Scale of Medicines.

The author is Superintending Pharmacist at the Royal Victoria Yard, Deptford.

A. G. B.

Monziols & Castel. **Toxicité comparée de la quinine injectée en solution physiologique et en solution huileuse dans les muscles et dans les veines du Chien.**—*C.R. Soc. Biol.* 1920. July 10. Vol. 83. No. 24. pp. 1038–1039.

Whereas in intravenous injections oil containing 35 mgm. quinine kills a dog in 3 minutes (smaller doses in the same medium were well borne), the same result is only reached with 75 mgm. in salt solution at 1 per cent. With intramuscular injections the difference is slight.

A. G. B.

Montel (M. L. R.). **Un cas d'anaphylaxie à la quinine. Ses variations suivant la voie d'absorption du médicament.**—*Bull. Soc. Path. Exot.* 1920. June 9. Vol. 13. No. 6. pp. 394–397.

A European long resident in the East, who had fever, warned the author that any dose of quinine would occasion in him erythema and dyspnoea. The author, sceptical, gave him a cachet containing 0·25 gm. [whether the alkaloid or a salt is not stated]. A few minutes later he had a scarlatiniform eruption over the whole muco-cutaneous surface, swollen face, watering of the eyes, dysphagia, dyspnoea, tachycardia, anxiety, intense pruritus especially in the soles and palms, pains in the limbs, feeling of fatigue, etc. These symptoms persisted for 3 hours and did not wholly disappear for 4 to 5

hours. The malarial state of the patient becoming worse, and arrhenal failing to relieve him, it was decided to give him an intramuscular injection of 0·5 gm. quinine. It was well borne and was followed the next day by one of 1·0 gm. repeated for five successive days, without the slightest symptom. The author discusses the case, comparing it with another in which similar symptoms followed the injection as well as the ingestion of quinine, but is unable to explain it.

A. G. B.

v. Szent-Györgyi (A.). **Ueber Chininrausch.** [Cinchonism.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 6. pp. 166–168.

Starting from the observation that after intravenous injection of a quinine salt a strong local vaso-constriction is seen in the ear of the rabbit, the author sought to overcome this, and the cinchonism of which it was the sign, by the use of vasodilators of the central nervous system. Of these caffeine and aspirin proved effective, removing the symptoms of quinine intoxication; 0·2 gm. caffeine and 1·0 gm. aspirin were used to 1 gm. hydrochloride of quinine. For use in man caffeine is recommended for intravenous injections, either with or just before the quinine, and a combination of aspirin with quinine for parenteral administration.

A. G. B.

i. Kennedy (R. S.). Remarks on Quinine Discussion at Medical Section of Science Congress on 16–1–1919.—*Indian Jl. Med. Res.* (Spec. Indian Sci. Congress Number, 1919). pp. 105–106.

ii. Cornwall (J. W.). Quinine in the Treatment of Malaria: What is known and what is not known about Quinine.—*Indian Jl. Med. Res.* (Spec. Indian Sci. Congress Number, 1919). pp. 83–88.

iii. Rosenthal (Werner). Bemerkungen zu dem Aufsatz von Ernst Rodenwaldt: Zur Frage der Chininresistenz der Plasmodien.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 5. pp. 142–144, Rodenwaldt (Ernst). Zu obigen Bemerkungen Werner Rosenthals, Göttingen.—*Ibid.* pp. 145–146.

iv. McDonald (W. M.). Quinine Prophylaxis.—*Jl. Trop. Med. & Hyg.* 1920. July 15. Vol. 23. No. 14. pp. 182–183.

v. Lenz (F.). Malariarezidive und Sonnenlicht.—*Muench. Med. Woch.* 1920. June 11. Vol. 67. No. 24. pp. 697–698.

vi. Reynolds (R. E.). Urobilinuria with Continuous Malarial Fever.—*Semana Médica.* Buenos Aires. 1919. Dec. 11. Vol. 26. No. 50. p. 735. [Summarised in *Jl. Amer. Med. Assoc.* 1920. May 8. p. 1358].

vii. Chazarain-Wetzel (Paul). Fièvres typho-malariennes et typho-lombricoses.—*Rev. Méd. d'Hyg. Trop.* 1914–1919. Vol. 11. No. 3–4. pp. 169–180. With 5 text-figs.

i. Co-ordinated research is necessary for progress in medical science.

ii. Many questions are asked concerning quinine the answers to which can be found in the volumes of this *Bulletin.*

iii. Observations on the definition of the terms "immunity" and "resistance."

iv. Quinine prophylaxis is advocated but no new observations are recorded.

v. This is a repetition of the author's speculations which were noticed in this *Bulletin.* Vol. 10. p. 157. They serve no useful purpose as they do not lead to new lines of research.

vi. A youth suspected of suffering from tubercle of the lungs which caused continuous pyrexia, had urobilinuria which fluctuated from day

to day, but ceased on the administration of quinine, to reappear when it was suspended. [There is no record of bacteriological investigations or of blood examination, and there is nothing to show that the diagnosis of malaria was correct.]

vii. Since no blood cultures, serum reactions or post mortem examinations were made in these cases, which were clinically of the enteric group, the report is of little value.

C. B.

i. Rocha (Alvaro da Franca). Nota sobre as altas dóses de quinina no tratamento do paludismo.—*Brazil Medico.* 1919. Sept. 6. Vol. 33. No. 36. p. 281.

ii. Kop (W. A.). Malaria zonder koorts, benevens eenige aanteekeningen omtrent het leucocytaire bloedbeeld. [A Case of Malaria without Fever with Notes on the Leucocyte Blood Picture.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1919. Vol. 59. No. 4. pp. 596–601. With 1 folding chart.

i. The author pleads for the use of "large" doses of quinine in the treatment of malaria, maintaining that the failures of quinine are due to insufficient dosage. He advocates for adults doses of 15 grains three times a day and states that with these doses he has had no failures nor any case of drug intoxication.

ii. Clinical history of a case of malaria in a Javanese sailor, in which all the symptoms of malaria were present except fever. The blood shewed a large number of quartan parasites in all forms. Curves illustrating the blood count day by day during period of treatment are given in a chart.

F. S. A.

BLACKWATER FEVER.

Goebel (Oswald). **Note sur des cas de fièvre bilieuse hémoglobinurique observés au Katanga.**—21 pp. with 4 charts. 1920. Bruxelles : Imprimerie H. Landy, 85, Rue Rasson.

Between 1908 and 1914 the author saw 39 cases of blackwater fever in the Katanga ; of these 10 (25 per cent.) were fatal. In a table it is shown that the incidence of the disease is greater during the first months of the dry season and coincides with the appearance of the cold months. There is no doubt that malaria plays an important part in the genesis of blackwater fever ; all the author's cases had malaria before developing blackwater and in the majority the latter condition was preceded by several malaria attacks. None of the 39 cases took prophylactic quinine regularly, some because they could not tolerate it, others because of indifference, and still others because they did not believe in its value : certain of them abstained because they considered it provoked blackwater. It was observed, however, that even the greatest opponents of prophylactic quinine did not hesitate to take large doses of the drug when they had an attack of fever. The author furnishes in a table information concerning the amount of quinine taken by 21 of his cases shortly before the development of blackwater.

With regard to accessory influences the author notes that in 4 of the cases blackwater followed on excessive fatigue ; alcoholism did not constitute a predisposing factor. Blackwater was most common amongst those who had lived for a long time in the country because they had had most malaria, but the disease was met with in a child of 13 years who had been in Africa only 7 months and also in persons who had lived there only one or two years. Certain persons are predisposed to the disease, some persons having had as many as ten attacks.

There follows a long account of the clinical development of the disease and details are given of four cases which illustrate the chief types met with viz :—(1) a mild case ; (2) a severe case with fatal termination and early anuria ; (3) a case where the disease developed after some days into an acute nephritis with anuria ; and (4) a case of intermittent haemoglobinuric fever.

The article ends with some remarks on treatment, which is purely symptomatic.

W. Yorke.

Gaskell (J. F.). **Notes on Blackwater Fever in Macedonia.**—*Ann. Trop. Med. & Parasit.* 1920. June 30. Vol. 14. No. 1. pp. 3–21. With 6 charts.

——. **Blackwater Fever in Macedonia.**—*Brit. Med. Jl.* 1920. July 24. pp. 122–123.

These two papers deal with the same matter ; they are based upon seven cases of blackwater fever observed by the author during the autumn and winter of 1917–1918. Twelve attacks of blackwater fever occurred among the seven cases, eight taking place in hospital and following rapidly upon the administration of quinine. Six of the

seven cases were Serbians, the remaining case was British. By the beginning of August 1916, when the British Base Hospital was first provided, the Serbian Army had become widely infected with malaria; nevertheless although some thousands of cases passed through the 41st General Hospital during the autumn and winter of 1916–1917, blackwater fever practically did not make its appearance until the autumn and winter of 1917–1918, when the Army had passed through two severe malarial seasons. The evidence available suggests then that blackwater fever occurs only in patients with chronic malaria. In 4 of the seven cases *P. vivax* was found associated with definite malarial attacks; in the other 3 cases no parasites were found and the blood was not examined until after the onset of the fatal attack. Nine of the ten attacks occurred during the cold weather, viz., between October 1917 and April 1918; between April and August 1918 no fresh attacks were seen. In all seven cases quinine was the final factor which determined the attack. The amount of the drug necessary to produce blackwater fever was found to vary from 20 grains to 80 grains; "that variation gave rise to the idea that each patient susceptible to blackwater had a critical dose which produced the disease, and that smaller doses could be tolerated by him without ill-effect." [Much smaller doses than 20 grains have been known to precipitate an attack of blackwater; the reviewer has seen it occur after a dose of 5 grains.]

The author infers from the evidence afforded by his cases that the continued administration of quinine after the onset of blackwater is most dangerous. [It must be noted, however, that much evidence to the contrary exists. Although, doubtless, quinine is the immediate cause of the majority of cases of blackwater fever, many cases make an excellent recovery notwithstanding continuous quinine treatment.]

The paper concludes with remarks on the cause of the disease, suppression of urine and the cause of death, and treatment.

The conclusions are as follows:—

"The details of the above cases support the view that the pathology of blackwater fever consists in the sudden occurrence of an extensive haemolysis in the blood stream brought about in certain cases of chronic malaria by the administration of quinine; exposure to cold is usually a contributory factor. The haemolysis is essentially chemical in nature and is completed within a comparatively short time, being in this respect very comparable to the haemolysis of paroxysmal haemoglobinuria. The excretion of the haemoglobin liberated can be successfully accomplished so long as it does not pass through the kidney in a too highly concentrated form. If it is too concentrated coagulation takes place in the loops of Henle, and suppression of urine occurs, which is usually fatal. Continuation of quinine administration increases the toxic conditions set up by the attack of blackwater fever and also increases the probability of suppression, though it does not appear to prolong greatly the period of actual haemolysis. Treatment should, therefore, be directed to the prevention of collapse and the dilution of both the haemoglobin and toxines by the administration of fluids in quantity by every available method. Quinine should be stopped immediately the blackwater fever is discovered; its further administration is both dangerous and also unnecessary, for the blackwater fever attack itself destroys the malarial parasites in the circulation.

"In any particular patient a critical dose of quinine is necessary to produce an attack of blackwater fever. Malarial attacks in such a patient can be successfully treated by doses below this limit."

W. Y.

GREENE (Edward F.). **A Case of Blackwater Fever: Recovery.**—*Lancet.* 1920. September 11. pp. 555.

Details are given of a case of blackwater fever in which the treatment administered consisted of frequent doses of phenacetin, gr. x (every two hours on the first day), half a pint of hot water with one teaspoonful of salt every half hour throughout the illness (5 days) and a hypodermic injection consisting of 10 minims of a ·1 per cent. solution of mercuric chloride on the 1st, 3rd, and 4th days.

The author attributes the successful recovery to the continuous use of the saline solution and the injection of the 1 in 1,000 perchloride of mercury solution. [Possibly this assumption may be correct but it is of course unwarrantable: why not attribute the recovery to the phenacetin ?]

W. Y.

WRIGHT (E. Hasell). **A Preliminary Paper on Observations on Black Water Fever (Haemoglobinuria) in the Coorg Province, 1917–1918, Especially as Regards its Etiological Factor, namely, a Protozoan Parasite of the Genus Piroplasma in Conjunction with the Malarial Plasmodium; or a New and Undescribed Species of *Laverania Malariae* (Donovan's Theory).**—*Indian Med. Gaz.* 1920. May. Vol. 55. No. 5. pp. 161–169. With 14 coloured plates & 1 chart.

The paper commences with brief clinical accounts of seven cases of blackwater fever met with by the author in the Coorg Province, Madras. A summary is then given of the "latest theories as to the etiology of haemoglobinuria." The tropical haemoglobinurias are divided into three types (1) Malarial, (2) Quinine haemoglobinurias, and (3) Blackwater fever. The author then deals with the various theories which have been advanced to explain the cause of blackwater fever and concludes by referring to a series of other diseases such as Rocky Mountain Fever, malignant jaundice of dogs, Japanese river fever, Texas fever, etc. Many coloured plates containing in all some hundreds of red cells infected with various malarial parasites, and some which were not pigmented ("piroplasma forms") illustrate the paper.

The conclusions are as follows:—

"(a) That blackwater fever is probably endemic in the province of Coorg, that it is more prevalent in some years than others, possibly coincident with the prevalence of haemoglobinuric fevers of animals. That the localities where this disease occurs is in the valleys of rivers, or valleys with marsh lands at the foot of the hills.

"(b) That the parasites observed may possibly prove to be a piroplasm in conjunction with the malarial plasmodium, or a special species of Laverania in conjunction with the known varieties of the malarial plasmodium or Laverania.

"(c) That there exists a malarial haemoglobinuria, and a quinine haemoglobinuria and a specific haemoglobinuria (B. W. F.), which may chiefly be differentiated by the presence or degree of jaundice present with other symptoms.

"The Coorg Province affords a wide field for the investigation of tropical parasitic diseases, especially the protozoa and entozoa. I have observed the malarial plasmodium of several types and have given the diagrams of the varieties noted this year (1919). In 1917 I observed malarial parasites in a case of quotidian subtertian fever, probably *Laverania praecox*. In the dissection of leeches and ticks, I have observed Trypanosomes and

Spirilla, the former probably *T. evansii* of surra, I have observed also a *spirochaete* in a horse suffering from fever, anaemia and debility and passage of red water, a *spirillum* in a fowl (*S. marchouxi* ?). Anchylostomiasis is a scourge in the province among the cooly class, and especially the plantation coolies, the admission rate for this disease in the Mercara Jail is nearly 100 per cent. on first admission into the Jail. All the hospitals show numerous cases of the disease; the dysenteries, amoebic, balantidium and bacillary, etc., are very prevalent, etc., etc.

"In conclusion, if by this paper I have in any way assisted in the elucidation of the cause of the important disease blackwater fever, my object has been fully attained. I desire to express my thanks to Lieut.-Colonel C. Donovan, M.D., Madras, for his kind and valuable assistance, and especially for the excellent plates of slide 2 of my second case, and that of Mrs. C.'s case (*L. praecox* ?)."

[It is almost impossible to make head or tail of this paper. The author rambles from one disease to another and his own observations are most carefully buried amongst a mass of matter which he has apparently extracted from various text books. The gist of the whole thing appears to be that the author suggests that certain non-pigmented piroplasma-like bodies, which he observed in the red blood cells of certain of his cases, may be the cause of blackwater fever.]

W. Y.

Fabre (Henri). **Essai de traitement autohémothérapique de la fièvre bilieuse hémoglobinurique.**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 336–338.

The author remarks that in the upper district of Tonkin (the Lao Kay province) 3 per cent. of 1,100 native troops developed blackwater fever during a period of two years, and of these cases a third were fatal. Each case remained on treatment for 45 days and then had an equal period of leave so that the total time lost was 90 days. M. Petit treated one case with old antidiphtheria serum; the result was satisfactory. Encouraged by this, Petit treated two other cases by subcutaneous injection of their own blood. Blood, 20 to 40 cc., was withdrawn from a vein and injected under the skin of the abdomen; this was repeated once or twice: the patient recovered quickly.

The author points out [not without reason] that good results in two cases will not permit of generalisation but is of opinion that the method ought to receive attention in the future.

Tejera stated in the discussion following the paper that in Venezuela they had obtained good results with horse serum in the treatment of blackwater fever.

W. Y.

Moreschi (Carlo). **Contributo allo studio delle emaglobinurie nei malarici (emoglobinuria da chinini e cinconina).** [Contribution to the Study of Haemoglobinuria in Malaria (Haemoglobinuria of Quinine and Cinchonine.)]—*Policlinico.* Sez. med. 1920. June. Vol. 27. No. 6. pp. 216–224. With 4 diagrams.

Reference is made to the work of Ascoli. It is already known that very small doses of quinine are capable of producing an attack of blackwater, and that the behaviour of the various salts is almost identical, taking into account the content of the alkaloid, its solubility and its speed of absorption.

Clinical details are given of the case of a child of seven years who suffered from a mixed infection of malignant tertian and quartan malaria. As a result of the effect of administering various drugs to this child, the author reaches the following conclusions :—

1. Quinine haemoglobinuria in a case of mixed malaria (malignant tertian and quartan) did not occur in the first thirty days, but on or before the 60th day from the 1st febrile attack, and after the administration of a total of 4 gms. of quinine hydrochloride by injection, and 8 gms. of quinine bisulphate orally, the whole amount being distributed over a period of 30 days.

2. Hydrochloride of cinchonine given hypodermically in daily doses increasing from ·05 gm. to 1·1 gm. (total 8·95 gms. in 26 days) was tolerated without producing symptoms of haemoglobinuria and reduced completely the quartan attacks, but possibly the action was only temporary. Novarsenobillon given intravenously in doses of ·15 gm. to ·5 gm. had no effect on the quartan attacks.

3. The first signs of haemoglobinuria as the result of cinchonine appeared on the 27th day after the first dose with an attack of moderate intensity following an injection of ·5 gm. of the hydrochloride. Intolerance rapidly increased, so that finally a dose as small as 4 cgms. produced an attack of haemoglobinuria of extreme gravity.

4. A patient already sensitive to quinine and cinchonine is also sensitive to quininide, cinchonidine, and to ethylhydrocuprine, and in a very high degree ; the smallest dose of quinidine and ethylhydrocuprine was 4 cgms. and for cinchonidine 2 cgms.

W. Y.

Cumston (Charles Greene). **Clinical Notes from France. Hemoglobinuric Bilious Fever.**—*New York Med. Jl.* 1919. Dec. 6. Vol. 110. No. 23. pp. 944–945.

This paper is simply a brief summary of some of the views which have been advanced to explain the mechanism of the haemolysis which occurs in blackwater fever.

W. Y.

SLEEPING SICKNESS.

Prophylaxie de la Maladie du Sommeil—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 477–485.

This is a Report of a Sleeping Sickness Committee, nominated by the Société de Patholgie Exotique, and consisting of Brumpt, Gouzien, Laveran, Leboeuf, Gustave Martin, Louis Martin, Mesnil and Roubaud. The resolutions were to be transmitted to the Colonial Minister and to the Governor-Generals of the French Colonies in west and equatorial Africa. A brief account of the distribution of the disease is given and attention is drawn to the fact that French equatorial Africa is gravely infected and that in certain places trypanosomiasis constitutes a veritable scourge ; of late years the condition has become aggravated more particularly in the Ibenga-Motaba, in Haut-Chari, and in Haut-Oubangui and M'Bomou.

The first of the prophylactic measures is the atoxylisation of the sick : it is necessary to multiply the number of doctors in order, by regular and methodical tours, to destroy the flagellates in the blood of the infected. Marvellous results would be easily obtained if there was in all infested regions a sufficient personnel for some years. This measure should be directed towards complete cure of those curable. Itinerant treatment could be completed by treatment administered at medical posts or in " villages of treatment."

One can hardly expect to cause the complete disappearance of the Glossina which swarm on the banks of most of the streams in equatorial Africa but measures can be taken to remove the inhabitants and protect them against the bites ; clearing is one of the most useful measures that can be adopted. Research should be undertaken to determine whether one cannot destroy the insects by introducing their natural enemies.

It is known that pigs are especially attractive to tsetse and perhaps it might be possible to arrange the herds of pigs and other resistant beasts in the vicinity of points most frequented so as to attract the Glossina and form a sort of protective screen. This question requires study. [If the pigs can harbour *T. gambiense* this appears to the reviewer as a remarkable suggestion in view of the stress laid on reducing the human reservoir of the virus by atoxylisation.]

There is no doubt that the spread of the disease is due to the incessant movement of porters and travellers, and administrative control must be exercised.

Villages situated in places where tsetse abound should be displaced. Chiefs of infested villages could render great service by applying numerous prophylactic measures (clearing, notification of cases of the disease, etc.) and should be made responsible for the execution of these measures ; it would be necessary to give them authority and to accord them certain prerogatives.

Want, excessive porterage, and fatigue favour the development of sleeping sickness. In particular the collection of rubber causes the natives to live in miserable conditions.

In June, 1908 the Society proposed a number of measures for the control of sleeping sickness. Many of these have already been applied and it is now necessary to follow up and complete the work already

commenced. With this object in view certain recommendations are made which the Society hopes to see applied in the French African Colonies. These measures are grouped under four heads :—

A. The general organisation of the service of prophylaxis of sleeping sickness.—These deal mainly with the personnel required, their training and their duties, and with the division of the country into various prophylactic sectors.

B. Therapeutic prophylaxis (atoxylisation).—These deal with the method of diagnosing cases and treating them. Those infected should be given, if a complete treatment is not practicable, every 4 or 6 months, or even every two months, two subcutaneous injections of ·75 to 1 gm. of atoxyl at an eight day interval.

C. Mechanical and agronomic prophylaxis.—These refer to such measures as destruction of tsetse by clearing, and protection of the population against their bites.

D. Administrative prophylaxis.—These deal with the regulation and superveillance of traffic, the issuing of sanitary passports, and the removal and rebuilding of villages.

W. Yorke.

Jamot (E.). **Essai de Prophylaxie médicale de la Maladie du Sommeil dans l'Oubangui-Chari.**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 343–376. With 1 folding map & 1 chart in text.

Owing to the interruption in prophylactic measures caused by the War, sleeping sickness in the Middle Congo and Oubangui-Chari regions increased greatly in severity. During 1916, the disease raged with such great intensity in the French equatorial Colonies that the Governor of the French Congo decided to organize a new prophylactic service : the activities of this Commission are recorded in this paper.

With limited personnel and material, almost all the villages in a territory at least 100,000 sq. kilometres were visited in a period of 22 months. Some 89,743 persons were examined, and 5,347 were found to be infected. The epidemic foci in Ouahm Fafa, in Gribingui, in the vicinity of Fort-de-Possel and on the banks of the Oubangui have been mastered, and the total number of deaths from trypanosomiasis has fallen from 2,071 to 714, that is a diminution of 65 per cent.; and by reducing the mass of virus in the circulation in proportions varying from 54 to 90 per cent. the danger of contamination has been correspondingly lessened.

Modern prophylaxis properly holds that it is essential to destroy, by chemical means, the virus in the blood of the patients. In order to accomplish this it is necessary to search out the sick, to attend to them and, if possible, to cure them. This implies minute inspection periodically of all zones infected, or merely suspected, and discovering the epidemic foci and following up to their extreme limit the various streams of infection. A rapid tour of inspection is insufficient, it is necessary to visit and revisit all villages and to examine all the inhabitants, and to administer adequate treatment.

Emphasis is laid on the importance of establishing in each Colony a good school where young natives, chosen from the most intelligent, could receive sound instruction which would fit them for the duties required at the present time from European Hospital orderlies. With

regard to the organisation of the service the personnel should be divided into a gang of examiners consisting of 5 or 6 native hospital orderlies, and two gangs to administer treatment, each consisting of two men. One of the last two gangs should work with the examiners, thus assuring a preliminary treatment of the sick as fast as they are recognised, and the other, directed by a European hospital assistant, would work separately and administer such treatment as was decided by the doctor and indicated on the sanitary tally delivered to each patient.

The minimum prophylactic measure consists in giving massive injections (1 gm.) of atoxyl every two or three months. In order to carry on the work satisfactorily in heavily infected districts, such as Ouahm Fafa, where the villages are far apart and the population scattered and communications difficult, the irreducible minimum as far as personnel is concerned is one doctor, three hospital assistants and ten native hospital assistants for 50,000 inhabitants.

The author is of opinion that it would be of very great interest to establish in each Colony which suffers from sleeping sickness a permanent prophylactic mission which would work under the authority of the Chief Medical Officer of the Colony, but which would be organised and directed in all its details by specialists who would be responsible for its operations ; such an arrangement would relieve the principal medical officer of all details.

W. Y

Piot (A.). **Sur le fonctionnement d'un secteur de prophylaxie contre la trypanosomiase au Congo français (1919).**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 376—384. With 1 folding map.

The Ibenga-Motaba district is the first which was organised for trypanosomiasis prophylaxis in accordance with the views expressed by the Sleeping Sickness Commission instituted by the French Colonial Ministry. A brief account of the country, its boundaries, its population and their occupation, and the Glossina found in it, are given. The method of procedure adopted in this prophylactic campaign is described. The population was assembled in the various villages, or from groups of villages, and was examined clinically, and those suspected of infection were examined in the laboratory, the trypanosomes being sought in the blood and in the gland juice. Those found to be infected were treated with atoxyl, the dose employed being 1·5 cgm. per kilo of body weight. Neosalvarsan was reserved for those cases of sleeping sickness also suffering from yaws. Advice was given to the chiefs of villages, who were warned of the danger of Glossina and a sanitary squad of 13 men was set apart to aid the inhabitants of each village in clearing the bush. Wells were sunk in most of the villages in the marshy zone. In accordance with the instructions the names of the infected were inscribed on pegs, one of which was given to the person interested, or to his parents, and the other to the chief of the subdivision. The names of all suspects were inscribed in a register, with the results of the examination. In a second register was a copy of the names on the pegs issued to the infected.

The results of the first tour of inspection in the district by the staff, consisting of 1 medical man, 1 European hospital sergeant, 4 native

hospital orderlies, with an equipment of 2 microscopes, can be summarized in the following table :—

	No. examined.	*No. examined microscopically.*	*No. infected with trypanosomes.*
Men	3,613	548	225 (6·2%)
Women ..	4,789	638	284 (5·9%)
Children ..	4,018	1,116	494 (12·0%)
Total ..	12,420*	2,302 (18%)	1,003 (8%)

* The total population.

The heavy infection of children does not agree with previous data on the subject. The distribution of the disease is shown on an admirable map which illustrates the paper.

It was frequently found that more than one member of a family was infected thus, in 1 case the father, mother and child were infected, in 7 cases the husband and wife, and in 12 cases the mother and child : in such cases mosquitoes seem to play the role of transmitting agent.

The date when the disease first appeared is very remote, the old people saying that many died of it when they were children. According to information collected it appears that formally the scourge was much more grave, and it is remarked that at Impfondo Heckenroth in 1911–12 found 5 per cent. of the population infected whilst the author in 1918 found only 2·1 per cent.

The paper closes with some remarks on the co-existence of yaws and trypanosomiasis. Of the 346 cases of yaws seen, 104 (30 per cent.) were infected with trypanosomiasis.

W. Y.

Schwetz (J.). **La maladie du sommeil dans le Nord-Katanga (Congo Belge) en 1913–1918.**—*Bull. Soc. Path. Exot.* 1919. Nov. Vol. 12. No. 9. pp. 671–680. With 1 map in text.

At the end of 1912 Schwetz was sent to the Lomami and surrounding districts to take charge of anti-sleeping sickness operations. The district in question is situated in the Katanga between the rivers Lubilash-Sankuru and Lualaba-Congo. The author remained here until the beginning of 1918. A description of the vegetation is given. The distribution of Glossina was found to be very unequal ; five species were found, viz., *G. morsitans*, *G. palpalis*, *G. pallidipes*, *G. brevipalpis*, and *G. fusca*. (In a footnote the author adds that in one place he found three other species, viz., *G. pallicera*, *G. tabaniformis* and *G. fuscipleuris*, but in very small numbers only.) The author discusses the distribution of the various species.

The disease probably appeared in the Haut-Lomami for the first time about the year 1900, and spread gradually all over the district, until in 1905–1907 its ravages were very great. In 1913, when the author arrived there, things had become less grave and the epidemic had begun to decline. There appears to be no doubt that *G. palpalis* is the principal cause of the disease, but the question is very complex and it is clear that tsetse alone cannot explain the course of the epidemic. Human trypanosomiasis being a relatively new disease, little is yet

known of its modalities. It seems probable that it behaves in the same manner as many other epidemic-endemic diseases, notably cholera and plague; that is to say we have a periodic succession of epidemic and endemic states. The etiology, or at least the epidemiology of the disease being still obscure, it is not astonishing that attempts at prophylaxis have up to the present failed to give brilliant results.

W. Y.

SUDAN: **Reports by Principal Medical Officer, Egyptian Army, on Sleeping Sickness for the Years ending 30th September 1918 and 30th September, 1919.** [CARROLL (F. F.) P.M.O., Egyptian Army.] —MSS. Reports dated from Headquarters, Egyptian Army, Khartoum, Dec. 16, 1918, and Nov. 30, 1919.

The areas dealt with in these Reports are Western and Eastern Mongalla, and Bahr-el-Ghazal.

1. *Western Mongalla.* The report on the Yei river district states that the conditions as regards sleeping sickness may be considered satisfactory and that the disease is under control. The increase in the number of cases detected (32 were admitted to Camp as against 14 in 1917) was confined to three villages which have always had a bad name in that part, and was not due to any extension of the disease to other parts. In the Kajo Kaji district the number of admissions was 41 as compared with 98 in 1917, but probably this hardly represents the truth, as owing to the death of the British Inspector, and the absence of his successor for the greater part of the year, much difficulty was experienced in collecting all the inhabitants during the tours of inspection.

2. *Eastern Mongalla.* A special medical officer on sleeping sickness duty was stationed here during the year and examined all persons arriving from the South. Only one case was discovered at the ferry where the main Opari-Kajo Kaji road crosses the Nile.

3. *Bahr-el-Ghazal.* Owing to the arrival of immigrants from the French Congo a grave outbreak of sleeping sickness has been produced in Bahr-el-Ghazal.

A brief summary of the work of the Sudan Sleeping Sickness Commission during the year 1918 is given in the following table.

Province.	District.	New cases found.	*Examinations.*		*Injections.*		
			by Palpation.	by Gld. puncture.	Atoxyl.	Arseno-benzol.	Antimony.
Mongalla ..	Yei River	32	93,262	128	3,017	—	28
,, ..	Kajo Kaji	43	7,534	78	1,597	6	39
,, ..	Nimule	1	21,786	3	1	—	—
Bahr-el-Ghazal	Wau	—	71	25	4	—	—
,,	Raga	10	15,296	48	789	—	9
,, ..	Tembura	255	11,790	796	1,298	—	—
TOTALS ..		341	149,739	1,078	6,706	6	76

Number of persons under treatment in Sudan Sleeping Sickness Camps on 1st October 1918 :—

Yei	216
Kajo Kaji	323
Raga	32
Tembura	232
TOTAL	803

No new area of human trypanosomiasis was discovered in the Sudan during the second period.

1. *Western Mongalla.* In the Yei river district the number of cases admitted to Camp was fifteen, of which eleven came from two villages, the rest of the district producing only four cases. The condition of affairs is thus very satisfactory. In the Kajo Kaji district there were 71 admissions.

2. *Eastern Mongalla.* Nine new cases of the disease were detected, six being found on the east bank of the Nile opposite Kajo Kaji.

3. *Bahr-el-Ghazal.* The number of fresh cases detected was 646 and Captain SPENCE estimates that in 1920 the total will probably reach 1,200.

A brief summary of the work done is given in the following table.

Province.	District.	New cases found.	*Examinations.*		*Injections.*	
			by Palpation.	by Gld-puncture.	Atoxyl.	Salvarsan.
Mongalla ..	Yei River	15	89,985	87	2.179	—
,, ..	Kajo Kaji	63	19,037	122	2,167	7
,, ..	Nimule	9	24,580	10	2	—
Bahr-el-Ghazal	Tembura	646	87,050	1.119	6,470	—
,,	Raga	9	12,620	19	414	—
TOTALS ..		742	233,272	1,357	11.232	7

Number of persons under treatment in Sudan Sleeping Sickness Camps on 1st October 1919 :—

Yei	154
Kajo Kaji	344
Tembura	690
Raga	33
TOTAL	1,221

Accompanying these Reports of the Principal Medical Officer are the detailed reports of the various medical officers in charge of the work in the different areas.

W. Y.

Chagas (Carlos). Translation by Ambrose (Lodilla). **Clinical and Anatomo-Pathological Aspects of American Trypanosomiasis.**—*New Orleans Med. & Surg. Jl.* 1920. May. Vol. 72. No. 11. pp. 630–660. With 1 text-fig.

In these lectures the author gives an excellent and full account of the disease which bears his name. Practically all the matter dealt with has appeared before in the numerous publications on this interesting disease which have been forthcoming from time to time. [This *Bulletin* Vol. 11, p. 165, and elsewhere.]

W. Y.

Torres (Magarinos) & Villaça (João). **Encefalite e mielite cauzadas por um Tripanozome** (*T. cruzi*). **Encéphalite et Myélite causées par un trypanosome** (*T. cruzi*).—*Mem. Inst. Oswaldo Cruz.* 1919. Vol. 11. No. 1. pp. 80–89. With 5 plates. (Translation in French. Second Section pp. 72–80.)

This paper is substantially the same as that previously published by these authors in the *Brazil Medico* and summarised in this *Bulletin* Vol. 15, p. 41.

The article is illustrated by five plates showing microphotographs of the nervous lesions.

W. Y.

Escomel (Edmundo). **Comprobación clinica y microscópica de la existencia en le Perú de la tripanosomiasis americana.**—*An. Facul. de Med. de Lima.* 1920. Jan.-Feb. Vol. 3. No. 13. pp. 14–17. With 1 coloured plate.

This paper is substantially the same as that already reviewed [this *Bulletin*, Vol. 15, p. 384]. It contains, however, a much better illustration of the parasite than that which appeared in the original paper. This illustration, which is coloured, depicts three trypanosomes which in two important respects fail to conform with Escomel's description: in the first place the blepharoplast is figured as if it were of quite the usual size and, in the second place, it is obvious that if one compares the length of the trypanosomes with the diameter of the leucocyte figured, none of the three parasites approaches 40μ in length.

W. Y.

Marshall (Claude H.). **Treatment of Sleeping Sickness by Salvarsanized Serum.**—*Brit. Med. Jl.* 1920. May 22. pp. 702–704.

Acting on the assumption that to obtain a cure in sleeping sickness, the trypanosome must, except in the earliest stages, be attacked in the spinal cord, as well as in the blood stream, the author commenced treating cases by intra-spinal injections of neo-kharsivan. Unfortunately the first case so treated died as a result of the injection, and the author therefore had recourse to neo-kharsivanized serum. The patients treated were roughly divided into five classes, according to the stage of the disease, as follows:—

"Class A.—Early cases with distinct glands, the juice of which contains scanty trypanosomes, but with no other signs. The patients consider

themselves quite well, and are only discovered by systematic examination of a large number of natives.

Class AB.—The glands are well marked and contain numerous trypanosomes. The patients do not feel well, and complain of pains and sleeplessness.

Class B.—In addition to above signs there are finger and tongue tremors, increased knee-jerks, headache, and pain in the limbs. Impotent.

Class BB.—Advanced cases, unintelligent, spastic, and uncertain gait.

Class C.—Almost comatose. Unable to walk or reply to questions."

The method is described as follows :—

" 1. An intravenous injection of neo-kharsivan is given, and after one or two hours 10 cc. to 40 cc. of blood are drawn off from a vein into a sterile vessel.

2. The vessel containing the blood is kept cool by being placed in a beaker of cold water for from twelve to sixteen hours, by which time the clear serum has separated from the blood clot.

3. A lumbar puncture is performed, and 15 cc. to 20 cc. of cerebro-spinal fluid drawn off, and a corresponding quantity of the serum, obtained as above, slowly injected into the spinal cord through the lumbar puncture needle by means of a large all-glass syringe."

The results of treating twelve cases are shown in the following table.

No. of case.	*Sex.*	*Class.*	*Dose of Serum.*	*Months since treatment.*	*Result.*
2	F.	AB.	20 min.	16	Well.
3	M.	A.	3 c. cm.	1	Disappeared.
4	F.	AB.	20 c. cm.	12	Well.
5	F.	AB.	8 c. cm.	1	Died (cause unknown).
7	M.	B.	15 c. cm.	6	Well.
8	F.	B.	15 c. cm.	4	Well.
9	M.	C.	20 c. cm.	1½	Died.
10	M.	BB.	15 c. cm.	2½	Improved.
11	M.	B.	21 c. cm.	1½	Well.
12	F.	AB.	7 c. cm.	1½	Well.
13	F.	B.	20 c. cm.	1½	Well.
15	F.	AB.	24 c. cm.	1½	Well.

The author considers that intra-spinal medication causes improvement in the patient and may prove to be a complete cure ; that it has a more beneficial effect than intravenous injections alone ; and that in advanced cases, even if the actual disease is arrested, the damage already done to the central nervous system is probably beyond repair.

W. Y.

Van den Branden (F.). **Le Salvarsan cuprique et son sel sodique dans le traitement de la trypanosomiase humaine.**—*Bull. Soc. Path. Exot.* 1919. Nov. Vol. 12. No. 9. pp. 680–701.

At the beginning of 1913 the author obtained from Ehrlich a new arsenical preparation, cupric Salvarsan, which is known as K_3. This

preparation is more active than salvarsan but also more toxic. For administration ·1 gm. was dissolved in ·7 cc. of double normal soda, the product diluted with 100 cc. of sterile water and injected intravenously.

Thirteen natives who had enlarged glands, the juice from which contained numerous trypanosomes, were injected with doses varying from ·1 gm. to ·3 gm. of the drug; in twelve, gland puncture 5 mins. later was negative, and in the remaining case it was negative 15 mins. later. The drug was well tolerated by the patients; two vomited about 3 hrs. after injection and the majority had a slight rise of temperature; otherwise there were no symptoms.

One case died three days after injection from arsenical poisoning; at the autopsy yellow atrophy of the liver was found. This patient, who weighed 40·5 kilos. had received ·2 gm. of the drug, i.e., about ·005 gm. per kilo. of body weight; his general health at the time of injection was good and there were no cerebro-spinal symptoms. Other cases tolerated well larger doses of the drug. The conclusion is, however, that the dosage of ·005 gm. per kilo. should not be exceeded.

With regard to the sterilising action of the drug it was found that of 3 cases who received a single dose of less than 5 mgm. per kilo. 2 relapsed within a month, the third being still negative after 72 days; two cases which received a dose of ·1 gm. on each of two consecutive days had relapsed after 3 months; of two cases which had received a dose of ·1 gm. on each of 3 consecutive days 1 relapsed a month after treatment, the other had not relapsed 82 days afterwards; of five cases who received a single massive dose of ·3 gm. one relapsed 45 days later, the other 4 had not relapsed 75 to 82 days afterwards.

In tables details are given of the result of treating 43 cases of trypanosomiasis with cupric salvarsan and in a second table the results of treating 3 advanced cases of the disease. The results obtained with those in the first stage of the disease are as a whole excellent, 14 not relapsing in periods varying from 6 to 14 months after treatment. In a proportion of cases, however, relapses were observed in less than a month. The results of treating advanced cases by repeated injections were unfavourable.

The author sums up his views regarding the drug by stating that it is a very active remedy, that minimum doses of ·005 gm. to ·0025 gm. per kilo. body weight have produced sterilisation of long duration and perhaps definite cure, that it is not advisable to give larger doses than ·005 gm. per kilo., and that it may be given in combination with tryparosan, trypaflavine or tartar emetic.

In 1914 Dr. Karrer (Ehrlich's assistant) sent the author a quantity of the sodium salt of cupric salvarsan. This product dissolves in water or in a solution of sugar and water. Thirty-four natives were treated with it; the drug was given intravenously after solution in 20 to 100 cc. of distilled water containing 5 per cent. sugar. The dose administered varied from ·1 to ·15 gm. in a series of injections and from ·4 gm. to ·6 gm. at a single injection, and was tolerated well.

The repeated administration of small doses gave poor results, relapses occurring rapidly: single massive doses gave better results; of 10 cases thus treated 6 did not relapse within periods varying from 5 to 12 months [see this *Bulletin*, Vol. 7, p. 105].

W. Y.

MANSON-BAHR (Philip). **The Intravenous Use of Acetyl-Aminophenyl Salt of Antimony (Stibenyl) in the Treatment of Human Trypanosomiasis and Kala-Azar.**—*Lancet.* 1920. July 24. pp. 178–180. With 1 chart.

——. **Treatment of Human Trypanosomiasis and Kala-azar by Intravenous Injection of Acetyl-p-aminophenyl Stibiate of Sodium.**—*Brit. Med. Jl.* 1920. Aug. 14. pp. 235–236.

The symptoms attributable to the direct toxic effect of antimony tartrate upon the human body may be classified as follows :—

(a) *Gastro-intestinal.*—(1) Coughing and retching at time of injection accompanied by choking sensation in pharynx. (2) Nausea and vomiting immediately after injection. (3) Delayed vomiting, commencing four to five hours after injection. (4) Acute diarrhoea lasting 24 hours.

(b) *Cardiac* (in trypanosomiasis). (1) Cyanosis. (2) Rapid and irregular pulse.

(c) *Cerebral* (especially in trypanosomiasis). (1) Loss of consciousness. (2) Incontinence of urine and faeces.

(d) *Arthritic* (in bilharziasis). (1) Pains in one or both shoulders commencing one to two hours after injection. (2) Acute arthritic pain prohibiting movement in all the large joints of the body, accompanied by intense lumbar pain, commencing six hours after injection and lasting for the subsequent 48 hours, noted in a recent case.

The author considers it desirable that a search should be made for an organic preparation of antimony less toxic to human beings, but more specific for protozoal parasites. Reference is made to the records of CARONIA on the successful treatment of leishmaniasis in young children with an organic compound of antimony, viz., acetyl-p-aminophenyl-stibiate of sodium prepared by the firm of Heyden in Dresden [see this *Bulletin*, Vol. 8, p. 7] ; the salt contains 38·5 per cent. of antimony and was soluble to the extent of 1 part in 20 of distilled water. The maximum dose for children under two years was ·1 gm. and for those over two years ·15 gm. Intramuscular injections were given on alternate days into each buttock, a total of 3·6 gm. being given in a period of three months. Manson-Bahr obtained from Messrs. Allen and Hanbury a quantity of a similar but somewhat improved drug known as "Stibenyl," containing 34·3 per cent. of antimony, and soluble in ten parts of water, and containing no trace of inorganic antimony. It is easily tolerated by man in individual doses of ·6 gm.

Details are given of the successful treatment of an intractable case of trypanosomiasis (*T. gambiense*) and of a case of kala azar by stibenyl. There was a complete absence of any toxic phenomenon. It is noted that the drug had no action on *Plasmodium vivax* and no effect on bilharziasis.

W. Y.

CLAPIER. **L'Iodosalyl dans la Trypanosomiase et dans le Pian.**—*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 246–248.

In view of the favourable results which DANIEL claimed to have obtained by the use of iodosalyl in the treatment of sleeping sickness

[this *Bulletin* Vol. 15, p. 43 and p. 389], Clapier decided to test the drug himself. He administered the freshly prepared iodosalyl to five cases of human trypanosomiasis, without obtaining any beneficial result, and consequently concludes that iodosalyl cannot entirely supersede atoxyl or other specifics even three or four months after mixed treatment by iodosalyl and an arsenical preparation ; the iodide is to be regarded merely as a medical accessory.

The effect of iodosalyl on seventeen patients suffering from yaws was equally unsuccessful.

W. Y.

Hughes (T. A.). **Identification of Three Strains of Trypanosomes from Cases of Sleeping Sickness Contracted in Portuguese East Africa with** *Trypanosoma rhodesiense.*—*Indian Jl. Med. Res.* 1919. Oct. Vol. 7. No. 2. pp. 464–474. With 1 plate & 1 chart in text.

This paper contains nothing new. The author isolated three strains of trypanosomes from patients who had contracted sleeping sickness in Portuguese East Africa. Subinoculation into laboratory animals showed that they were all *T. rhodesiense.* Details concerning the pathogenicity of the three strains in various laboratory and domestic animals are given in tables.

The parasites are illustrated in a plate. [The author states that " in very heavy infections round leishmania-like forms were seen " and that " some of these had flagellae " : the three figured (Figs. 9, 13 and 15) are, in the reviewer's opinion, simply degenerating forms ; he has frequently seen such forms not only in *T. rhodesiense* but in *T. gambiense* and in many of the trypanosomes pathogenic to domestic stock.]

W. Y.

Zeiss (Heinz). **Die Einwirkung menschlichen Serums auf menschenpathogene Trypanosomen.** [The Action of Human Serum on Trypanosomes Pathogenic to Man.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. May. Vol. 24. No. 3. pp. 73–92.

After giving a summary of previous work on this subject, the author records the result of a series of experiments made by himself. He used in his work four strains of *T. gambiense* (from the Cameroons, Uganda, East Africa and Togoland, respectively), one strain of *T. rhodesiense* and one of *Schiz. cruzi.* The history of these strains, all of which had been maintained in the laboratory, by passage through animals, for many years is given in a table. The author's experiments can be divided into three main groups, firstly " Mixture " experiments, where the human serum and trypanosomes were mixed in the proportion of 1 cc. of serum to $\frac{1}{2}$ cc. of a concentrated suspension of trypanosomes and the mixture, after standing three minutes, injected intraperitoneally into the experimental animal ; secondly, " Therapeutic " experiments in which the experimental animals were given 1 cc. of the serum subcutaneously 1 to 4, or in one case 7 days after inoculation with the virus ; and thirdly " Prophylactic " experiments in which the experiments were given three doses of serum (two of ·5 cc. and one of 1 cc.) and then inoculated with the virus.

The results are summarised as follows :—

1. Two strains of *T. gambiense*, which had been maintained in mice, rats and guineapigs for fifteen years after isolation from man, when mixed with normal human serum were influenced to the extent that the incubation period and length of life of the inoculated animals were prolonged. No therapeutic or prophylactic action of the serum was observed.

2. In the case of two other strains of *T. gambiense* (from German East Africa and Togoland, respectively) which had been isolated from man six years previously, normal human serum failed to exert a therapeutic action, nor was there any definite lengthening of the length of life of the inoculated animals.

3. In the case of a highly virulent seven years old strain of *T. rhodesiense*, normal human serum had no effect, either when injected prophylactically or at the same time ; on the contrary normal human serum administered in therapeutic doses of 1 cc., in one case four days after infection, was completely active ; the parasites did not appear and at the time of writing 3½ months later, the animal was still alive. In similar experiments, two days after infection, equally successful therapeutic results were obtained. Further 50 per cent. of *rhodesiense* infected animals at the height of the infection were cured by a single dose of 1 cc. of normal human serum, an observation which has also been made by French authors.

4. Against a seven year old strain of *Schiz. cruzi*, normal human serum had no action when injected prophylactically or at the same time, and its therapeutic effect was limited to prolonging of the incubation period and length of life. In the case of this trypanosome, the indefinite duration of the infection increased the difficulty of the observation.

5. The serum of a case of Cameroon sleeping sickness cured three years previously had no action against a *rhodesiense* and a *gambiense* strain.

6. The question why *T. rhodesiense*, pathogenic to man and highly virulent, outside the human body is, like the pathogenic trypanosomes of animals (nagana, surra, mal de caderas), subject to the action of normal human serum, is at present not solved.

W. Y.

Schilling (Claus). **Adrenalininjektion zur Provokation bei Trypanosomeninfektionen.** [Adrenalin Injection as a Provocative in Trypanosome Infections.]—*Arch. f. Schiffs.- u. Trop.-Hyg.* 1919. Aug. Vol. 23. pp. 347–348.

The property possessed by adrenalin of producing contraction of smooth muscle, particularly of the muscles of the vessels, has been used, following a suggestion of von Oehme, first by von Neuschloss and then by Schittenhelm and Schlecht for the diagnosis of malaria [see this *Bulletin*, Vol. 14. p. 72]. Schilling performed a series of experiments to ascertain whether adrenalin, when injected into rabbits suffering from Nagana, would cause an increase in the number of parasites in the peripheral blood. The enumeration was made either by determining the number of parasites in a given number of microscope fields of a thick drop preparation, or by taking up 10 cmm. of blood in the pipette of a Gowers' haemoglobinometer and spreading

it within a marked area on a slide, staining, and counting the number of parasites it contained.

The following table shews the great escape of parasites to the peripheral blood: at the same time a distinct increase in the white corpuscles was observed:—

	Exp. 1. 19 days after infection. ·2mgm. of adrenalin subcutaneously.	Exp. 2. 33 days after infection. ·5mgm. of adrenalin subcutaneously.	Exp. 3. 23 days after infection. 2·0mgm. of adrenalin subcutaneously.
Before Adrenalin injection . .	22 Tryps. in 50 fields	No Tryps. in 50 fields	54 Tryps. in 10 cmm.
Immediately after	—	—	47 ,, ,, 10 ,,
2 hours after	67 Tryps. in 50 fields	78 Tryps. in 50 fields	—
3 ,, ,,	—	168 Tryps. in 50 fields	256 Tryps. in 10 cmm.
4 ,, ,,	—	115 Tryps. in 50 fields	—
5 ,, ,,	47 Tryps. in 50 fields	—	—
6 ,, ,,	—	—	193 Tryps. in 10 cmm.
8 ,, ,,	58 Tryps. in 50 fields	—	—
9 ,, ,,	—	—	382 Tryps. in 10 cmm.

This method is applicable in the case of man; 1 mgm. of the drug should suffice, and also in the case of dourine in horses, and in the case of trypanosomes in home-bred cattle and sheep. The dose for large animals is 15 to 25 mgm.

W. Y.

Müller (Johannes) & Simons (Hellmut). **Der Einfluss des Hungers auf den Verlauf einer Trypanosomeninfektion (Nagana).** [The Influence of Starvation on the Course of a Trypanosome Infection.] —*Zeitschr. f. Biol.* 1919. Nov. 25. Vol. 70. pp. 231–244. (Summarised in *Bull. Inst. Pasteur.* 1920. May 15. Vol. 18. No. 9. p. 304.)

In view of the fact that trypanosomes live in the blood in the products of digestion of the infected animal, the authors decided to ascertain the influence of starvation on the evolution of the parasites. Mice infected with nagana were used; some were given water only and others a broth made with milk and flour. It was found that the ratio of the number of parasites in the fed animals to that in the starved animals was always above 1; reaching sometimes a high figure, viz. 4 to 80, and exceptionally 160: the figures are especially high when only few trypanosomes were injected.

Confirmation of this influence is seen in the relative degree of multiplication of the trypanosomes in the circulation, i.e., the ratio of the number of parasites found at any given examination to that found at a preceding examination: this ratio is much less in fasting animals.

Tables show that the two groups of mice died in almost the same time, viz., 5 to 6 days.

In an appendix are recorded the first observations of starving guinea pigs infected with nagana. Starvation prevents the production of antibody and details are given of an instance where the number of parasites gradually but constantly increased up to the time of death, whereas the control animal exhibited a crisis of ten days duration.

W. Y.

Nöller (W.). **Neuere Forschungen auf dem Gebiete der Trypanosomenzüchtung.** [Recent Investigations on Cultivation of Trypanosomes.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. June. Vol. 24. No. 6. pp. 168–172.

The genera Crithidia and Trypanosoma are both characterised by the possession of an undulating membrane, which extends in Crithidia only to the front of the nucleus, but in Trypanosoma beyond this structure and often to near the posterior extremity of the body. Much doubt has arisen concerning the independence of the genus Crithidia. Both genera occur almost only in the blood of vertebrates and in the gut of blood sucking insects. Only certain bugs which have not been proved to suck the blood of vertebrates also harbour Crithidia. Trypanosomes in the gut of the intermediate host usually, and in artificial cultures always, assume a crithidial form. Development in the intermediate host differs from that in culture in that on completion of the process the trypanosome forms always appear in the former case ; they appear only exceptionally in the latter case. Crithidial forms in cultures and in the intermediate host are frequently non-infective, an observation which was explained by the assumption that possibly a sexual development of the trypanosomes occurred in the intermediate host. Trypanosomes in the blood live under conditions essentially different from those in the intermediate host, firstly in that the blood is a moving medium and secondly in that it has a much higher temperature.

The author performed a series of experiments to determine the influence of temperature on the form of mammalian and avian trypanosomes.

Schizotrypanum cruzi was kept alive in plate cultures for over a year ; it grew best at 30° C, but a well established strain would grow at room temperature ; at 37° C. the cultures soon degenerated. The type met with on the plates were partly leishmania forms, but also Crithidia forms and occasionally, especially at 30° C., true trypanosome forms. The cultures remained virulent for a long period : twelve months old cultures of the fifteenth generation infected all of six injected mice in the normal time ; three of them died on the 48th, 57th and 65th days, respectively, and the remaining three were alive, but still infected, on the 100th day.

Experiments were also conducted with *T. melophagium*, the sheep trypanosome, with three strains of avian trypanosomes, with *T. theileri* and with *T. rabinowitschi*.

As a result of this investigation, the author reached the following conclusions :—

1. Since the conversion of trypanosomes into Crithidia and vice versa can be produced *in vitro*, the various forms in the intermediate

host cannot be regarded as a sexual development. Sexual processes do not occur *in vitro*. The single regulative process in the change from the crithidia form to the trypanosome form consists in the differentiating off of a protoplasmic mass with the reserve stuff granules at the pointed posterior end.

2. The genus Crithidia is thus to be regarded as synonymous with Trypanosoma ; it is probable that the trypanosomes of the non-blood-sucking bugs, which do not change their host, also change into trypanosome forms under the conditions of the blood trypanosomes.

3. The fact that at 37° C. multiplication of trypanosomes in culture slackens or ceases, supports LEGER'S theory of the origin of trypanosomes from flagellates of invertebrate animals, which exhibit their greatest multiplication at lower temperatures. In some trypanosome groups indications in this direction are still visible, viz., their rareness in the blood and the fact that they seldom or never multiply in the peripheral blood. From these forms one passes via the African pathogenic trypanosomes, which multiply solely in the blood, to the trypanosomes which are transmitted purely mechanically and finally to *T. equiperdum* which no longer requires an intermediate host.

W. Y.

RUPPERT (Fritz). **Ueber labile Immunität bei der Tsetsekrankheit.** [On Labile Immunity in Trypanosome Disease.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Feb. Vol. 24. No. 1. pp. 1–8.

The customary form of immunity against bacteria is a sterilising immunity ; antibodies are produced in such amount that they exterminate the bacteria, so that after the termination of the infection the host contains only antibody. The type of immunity against blood invading protozoa is labile immunity ; the protozoa cause the formation of antibodies which protect the host against a new infection, but are not capable of exterminating the protozoa already infecting the host.

As a result of a series of observations on this subject of protozoal immunisation, the author reaches the following conclusions :—

1. Whether a sterile or labile immunity arises after East Coast fever is still an open question.

2. Labile immunity against tsetse infections occurs in cattle and in horses and mules.

3. Labile immunity can be produced by the aid of powerful trypanocidal chemicals.

4. The duration of labile immunity depends very much on the manner in which the animal is looked after.

W. Y.

OESTERLIN (Ernst). **Zur Chemie des Trypanosomenkerns.** [On the Chemistry of the Trypanosome Nucleus.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. May. Vol. 24. No. 3. pp. 65–73.

Reference is made to the work of UNNA and TIELEMANN on this subject [this *Bulletin* Vol. 15, p. 48].

The material used by the author in his experiments consisted firstly of blood films and secondly of cultures. The films were made from mice infected with *T. gambiense*, *T. equiperdum* and *T. brucei*. It is

remarked that similar results were obtained in the case of all three trypanosomes as well as with the tertian malaria parasite. The cultures used were those of *Halteridium syrnii*, a trypanosome obtained from the blood of a goshawk, and a trypanosome discovered by Nöller in the blood of a crossbill. The cultures were treated in two ways: either by making films and then subjecting to the action of the various reagents, just as in the case of the blood film, or by using a little of the culture with the reagent which was thus allowed to act on the living parasites. The author found that :—

1. The trypanosome nucleus retains its capacity of staining with Giemsa in spite of previous treatment with 1 per cent. HCl and H_2SO_4 solutions for 12 hours. Even after 24 hours the same result is in general obtained except in the case of films several months old and in the case where sulphuric acid has acted on the living culture.

2. After subjecting the preparation to the action of a saturated watery solution of silver sulphate for 12 hours the trypanosome nucleus stained with Giemsa.

As a result of these and other similar observations the author doubts the validity of certain of the conclusions reached by Unna and Tielemann, particularly as to their statement that the nucleus protein consists of histone. In conclusion Oesterlin states that in the previous treatment with dilute mineral acids we have a procedure, which, in morphological studies of protozoon nuclei subsequently stained with Giemsa, is capable of giving very sharp, clear, pictures, and perhaps also further elucidation.

W. Y.

Sergent (Edm. et Et.) & Donatien (A.). **Deuxième note sur l'hérédité de l'infection et de l'immunité dans la trypanosomiase des dromadaires.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 525–527.

The offspring of two camels, which as a result of treatment had recovered from all symptoms of infection with *T. berberum*, were not infected, although examination of the blood of the parents proved them to be still infected. The young, however, were not immune as when inoculated with *T. berberum* they contracted the disease and died. Contrasting these results with those previously obtained [this *Bulletin*, Vol. 15, p. 46], the authors conclude that camels in the acute stage of *debab* transmit the virus to their offspring which die of it; whereas camels in the chronic stage, characterised by a slight infection and a relative immunity, transmit to their offspring neither their infection nor their immunity.

W. Y.

Curasson (G.). **Sur l'infection du cheval et du mulet par *Trypanosoma dimorphon*.**—*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 241–245.

An account is given of the symptoms and results of treatment of horses and mules infected with *T. dimorphon*. The chief character of the infection is its chronicity, although acute attacks are more frequent than is generally recognised and more so in the horse than in the mule. Muscular weakness, and oedemas of the posterior

extremities and genitals are the most marked symptoms ; the oedemas were observed in about half the cases and are due to cardiac weakness, which is extreme. Ocular symptoms were almost constantly present : there was a persistent conjunctivitis with abundant lachrymation, petechiae were common, and a diffuse keratitis was observed in half the cases. In the mule the symptoms were milder, the ocular lesions rarer and the oedemas were not seen.

In his therapeutic experiments, the author employed galyl, administered intravenously into the jugular vein, in two weekly doses of respectively 2 gm. and 1 gm. Of the four mules and six horses treated in this manner, four died (one mule and three horses), and the remainder recovered. Two of the horses which died were practically moribund at the time of treatment.

W. Y.

Haughwout (Frank G.) & Youngberg (Stanton). **A Trypanosome associated with a Fatal Disease in the Carabao.**—*Philippine Jl. Sci.* 1920. Jan. Vol. 16. No. 1. pp. 77–87. With 3 plates & 2 text-figs.

The trypanosome to which this paper relates was found in blood smears made at an autopsy on a Philippine Carabao which had been killed as the result of serious symptoms—fever, bloody diarrhoea, haematuria, cutaneous haemorrhage, difficult breathing, bloody discharge from the nostrils, and gaseous swellings on the back and neck.

Numerous trypanosomes were found in the blood films ; these were much larger than *T. evansi* and in many respects resembled *T. theileri*. Unfortunately most of the trypanosomes were degenerated but 100 individuals were seen in a fair state of preservation. The length of the body varies from 22μ to 45μ and that of the free flagellum from 15μ to 26μ. The nucleus was situated about the middle of the body and the parabasal body (kinetonucleus) about the beginning of the posterior fourth of the body. In seven cases, however, the parabasal body lay close to the nucleus and in others actually anterior to it ; this was observed in the larger as well as in the shorter individuals.

Measurements of the 100 best preserved individuals were made and the size distribution plotted in the form of a curve.

The authors believe that this trypanosome resembles more closely *T. theileri* than any of the other larger trypanosomes. Three plates illustrate the paper.

W. Y.

Tejera (E.). **Trypanosomiases animales au Venezuela.**—*Bull. Soc. Path. Exot.* 1920. Apr. 14. Vol. 13. No. 4. pp. 297–305.

The first portion of this paper deals with the trypanosomiasis of Equidae. The disease is found frequently in horses and is not uncommon in mules and donkeys : it assumes two forms which were for a long time regarded as two different morbid entities. The one form is known in Venezuela by the names "peste boba," "hermosura," and "tristeza" ; it is characterised by emaciation, oedema and general feebleness ; the onset is insidious and the disease runs a course of about two months and in 80 per cent. of cases ends fatally. The other form is known locally as "disrengadera" and is characterised by

progressive emaciation, and very marked anaemia ; the animal is easily fatigued and exhibits tachycardia and dyspnoea ; the mortality in this type of the disease is said to be 100 per cent. There is again an acute form of the disease in which the animal is suddenly overwhelmed and dies immediately.

The cause of the disease of equines in Venezuela is the trypanosome discovered by ROUGET ; it is of the *evansi* type, has a mean length of 16 to 20μ and has been called by Mesnil *T. venezuelense.* The author has examined the pathogenicity of the parasite in laboratory animals—guineapigs, rats, mice, a horse, an opossum, two monkeys, a cat and a heifer. In the guineapig, the course of the infection was 20 to 30 days, in mice 12 to 18 days, in grey rats 5 to 18 days, in the experimentally infected horse 55 days, in the opossum 22 days, in the monkeys (*Mycetes ursinus* and a cebus) 19 and 24 days respectively; in the heifer the disease ran a chronic course, the animal exhibiting practically no symptoms, but its blood remained infective for guineapigs.

The second part of the paper deals with the trypanosomiasis of cattle. In the blood of cows, the author found a trypanosome which had the following morphological characters :—The nucleus was oval and situated near the middle of the body, the blepharoplast was distinct and situated near the posterior extremity, the undulating membrane was plainly visible and the free flagellum was 5 to 6μ in length : the total length of the parasite was 16 to 23μ, and the breadth 1·5μ. The parasites were never numerous. The infected animals were emaciated, anaemic, and exhibited oedema.

Inoculations of infected blood into guineapigs and a cat were unsuccessful. The parasite is probably identical with that found by LEGER and VIENNE [this *Bulletin*, Vol. 15, p. 45] in cattle in French Guiana and called by them *T. guyanense.*

On account of the fact that it fails to infect rats, mice, guineapigs, dogs, cats and monkeys, Tejera believes that it is more closely related to *T. cazalboui* than to *T. evansi* or *T. venezuelense.*

W. Y.

GAUTHIER (M.). **Sur le " trypanosome " de la Truite.**—*C. R. Acad. Sci.* 1920. Jan. 5. Vol. 170. No. 1. p. 69–70.

All workers are agreed that the first trypanosome was discovered by VALENTIN, in 1841, in the blood of a trout, but in view of the fact that nobody has as yet re-discovered this parasite and as the original description is somewhat inadequate some doubt exists as to its true nature and systematic position.

The author encountered the parasite in very small numbers in December 1919, in the blood of five of seven trout from a stream in the neighbourhood of Grenoble. In the living condition the parasite presents the appearance of a dark vermicule, very granular, and extremely mobile, sometimes elongated and appearing to swim with an undulating movement, and sometimes rounded up and appearing to protrude and withdraw pseudopodia with the greatest rapidity. Without artificial means it is impossible to distinguish flagella and consequently it is not surprising that VALENTIN regarded the parasite as an amoeba.

Its true morphology can only be determined by retarding its metabolic activity by such means as adding to the blood a little methylene blue which at the same time renders the flagella visible. It is then seen that the body is elongate, slightly bent, 30μ to 40μ long (without the flagella) and 5μ to 6μ broad. Its anterior extremity is narrowed into a sort of snout, extensible, very motile, capable of altering its form, rich in myonemes and bearing an undulating flagellum 15μ long. Posteriorly the body narrows to an obtuse point with a short almost rigid subterminal flagellum forming the termination of an undulating membrane which takes origin at the base of the snout.

The young forms, which were rarely seen, are transparent, but the adults are, except for the snout, full of granules (reserve substance) giving the parasite the characteristic opaque appearance. On account of these granules it is difficult to make out cytological details in fixed and stained preparations ; the nucleus is oval, submarginal and situated towards the anterior third of the body, and a little in front of it is a large arc shaped blepharoplast ; the flagella do not stain well and the undulating membrane is often hardly visible.

The conclusion is that the parasite discovered by Valentin in the blood of a trout belongs to the Genus *Trypanoplasma* (Laveran and Mesnil) and constitutes a new species for which the name *T. valentini* is proposed. The transmitting agent is in all probability a small leech, *Piscicola geometra.*

W. Y.

BOOK REVIEWS.

MINETT (E. P.). [M.D. ; D.P.H. ; D.T.M. & H. ; M.R.C.S. ; L.R.C.P. Government Medical Officer of Health, British Guiana, etc.] **Diagnosis of Bacteria and Blood-Parasites.** Third Edition—viii + 94 pp. 1920. London : Baillière, Tindall and Cox. [Price 4*s.* 6*d.* net.]

The present edition of this booklet is stated in the preface to have been revised and brought up to date. Its perusal, however, reveals many and surprising inaccuracies, and too often valuable space is occupied with antiquated descriptions and superfluous technical procedures peculiar to bacteriological text books of a past age.

We are informed, for instance, that *B. dysenteriae* (Flexner) is a "sluggishly motile" organism and that *B. leprae* is "somewhat difficult to grow, necessitating special media," etc. The antigen chosen for the Wassermann test is that of the original formula, viz. extract of a syphilitic liver. In the diagnosis of *V. cholerae* no mention is made of the agglutination test with high-titre serum. The treatment of the anaerobes is so inadequate as to be valueless for reference. The "flaginac" test for *B. coli*, now abandoned by its author, is duly mentioned. In connection with the morphology of trypanosomes we are told that "two chromatin-like bodies are usually present, staining purple—one near the middle, and the other near the antiflagellar end. A vacuole between the two can also often be seen to exist and an undulating membrane can sometimes be demonstrated." In connexion with malaria it is stated : "Failing the above (*i.e., a benign tertian case*) a long-standing case of subtertian malaria with marked cachexia will afford the best opportunity (*i.e., for securing material for examination*) as in this form it is generally an easy matter to find crescents and numerous ring forms."

Without radical revision the book cannot function as the pocket reference book it claims to be.

J. C. G. Ledingham.

BROOKE (Gilbert E.). [M.A. Cantab. ; L.R.C.P. Edin. ; D.P.H. ; Chief Health Officer, Straits Settlements Government Medical Service ; etc.] **Medico-Tropical Practice : A Handbook for Medical Practitioners and Students.** Second Edition Revised and Re-written—xii + 522 pp. With 57 figures, 2 maps & 2 plates in colour. 1920. London : Charles Griffin & Co. Ltd. [Price 18*s.* Net.]

A volume of conveniently small size with rounded corners suggests at once a "guide" which may be carried in the pocket ; doubtless a book containing concise and practical information for the tropical practitioner. One's interest is at once stimulated !

The choice of title however at once offends and throughout the book the reader is constantly conscious of halting phraseology, bad composition, much that is ungrammatical and many clerical errors.

The first chapter deals with Tropical Environment ; the second with Heat and Light Effects wherein will be found physiological data to which many will be unable to subscribe, a considerable amount of discursive writing and many omissions. One wonders whether it is necessary to include in a book of this size notes to the effect that "flax is a small annual with pale blue flowers" or that "leather is the tanned skin of animals used for several clothing purposes, boots, shoes, belts and gloves ;" while a discussion of a really efficient mosquito net or a note on the really essential principles of infant feeding in the tropics would have been useful.

The author strains at being all-inclusive and as is often the case the subject matter suffers. In referring to ladies' clothing, while Dr. Brooke is apparently adamant on the subject of corsets—"the stays should be of open cellular material of a coffee colour, whale bone frame," he allows a certain latitude in sunshades—"Parasols" may be "covered with lace and lined with chiffon or otherwise as fancy may dictate or fashion demand"!

In dealing with sunstroke, for which the author uses the term Phoebism for no very apparent reason and for which among synonyms he gives the words "heat exhaustion" presumably in error, a long dissertation on rays of all kinds is given which appears out of place in a book of this size. The author naively remarks "other rays, such as Wiedemann's rays, Thompson's paracathodic and diacathodic rays, and Goldstein's rays do not call for mention in such a chapter as this," an opinion which I am sure all his readers will share.

Again, in the chapter dealing with the Blood, too much has been attempted. One fails to see that any purpose is served by his description of a method for estimating blood-sugar; accurate results would certainly not be obtained; nor are the paragraphs on acidosis of any practical value. But acidosis in these days is as blessed a word as Mesopotamia and doubtless must therefore be mentioned.

Later, many descriptions of morphology and life histories of parasites are obscure while clinical descriptions are often very ragged, lack precision and include many inaccurate observations too numerous to allude to. The treatment of yaws and syphilis is not up to date; the treatment advocated for malaria will not be approved by the majority of men with tropical experience. The trypanosomiasis due to infection with *T. rhodesiense* is said to be a chronic disease, whereas many cases run a very acute course.

Blackwater fever is said to occur in natives—while we know that the disease occurs among the natives of India, I have yet to hear that authenticated cases in African natives are anything but a rarity.

No mention is made of antimony in the treatment of bilharziasis.

The description of pellagra is very poor indeed.

The all important question of the disposal of night-soil is scantily treated.

Hugh S. Stannus.

James (S. P.). [M.D., D.P.H. (Lieut.-Colonel, I.M.S., retired) etc.]. **Malaria at Home and Abroad.** xi+234 pp. With 1 coloured map & 104 full-page and text-figs. 1920. London. John Bale, Sons & Danielsson, Ltd. [Price 25*s.* net.]

The author in an explanatory note defines the scope of this book. It "is intended to be an elementary guide to medical men and administrators who may have to deal with malaria at home or abroad." It "does not pretend to be a complete treatise and it is by no means free from omissions, some premeditated, others unintentional." If we recollect this when we read these simply and pleasantly written pages, we shall not be tempted to expect light thrown on the many dark tracts of malariology. That the "administrator" will always be able to follow what is said may be doubted, but he will find in these pages good advice, if he is intelligent enough to follow it. We have read these pages with some care and we have noted what we take to be errors, dubious statements, and the like. For example, leaving aside the point as to what "the administrator" will make of the interesting plate opposite p. 2, the terms *Haemosporidia* and *Coccidia* are not those of Families, nor is *Plasmodidae* a Sub-family name, and *Falciparium* should be *Falciparum*.

On p. 11 it is stated that in a first attack of malaria "gametocytes appear in the peripheral blood about a week after the onset of definite attacks of fever." This is contrary to our experience in cases (first attacks) of simple tertian malaria contracted in this country, and we are uncertain as to its truth in other species of parasites. Nor do we consider "it is well known" that when gametocytes first appear in the peripheral blood they are immature and non-infective to anophelines; but still, in an elementary

treatise dogmatism has a well recognised place. The remark on p. 13 that the numerical prevalence of mosquitoes is only one of the many factors which influence the spread of malaria, is much to the point, and shews that the author has studied malaria "in the field" and has not merely discoursed on the subject from a theoretical standpoint. For the appreciation of the economic factor, the factor of environment, etc., it is necessary to go into the towns and villages and into the huts of the natives; to ascertain what rivers, canals, pools, wells, etc. contain larvae, in fact to acquire first hand knowledge, and in the tropics, at least, to sweat in doing so; then to study the question and re-examine the conditions where necessary. How much easier, however, to shirk hard work and to write of malaria as an "authority," without this knowledge and invent facts to suit a theory!

Chapters III and IV are devoted to practical work on the parasites and mosquitoes respectively. We doubt the value of these for the elementary student, not that there is any want of clarity of exposition, but because we believe "it simply can't be done." Only by laboratory work under skilled guidance can these things be properly learned, and even then the average student finds the acquisition of such knowledge difficult. We have often dissolved Leishman's stain in absolute alcohol and found the solution to stain properly—we think the use of methyl alcohol (free from acetone) is somewhat of a fetish. On p. 21 the author rightly says that the film should occupy the middle area of the slide, but Fig. 12 does not show this, and the film depicted has one edge which it would be almost impossible to examine.

In Chapter IV, on mosquitoes, it might have been said that the collector can store mosquitoes for future examination and mounting, with safety, by simply placing them on a layer of cotton wool in a suitable box.

Chapter V is devoted to the essential features of a malaria survey. We think that here, and elsewhere, the text would gain by the omission of the names of various medical men whom the author met from time to time, as not being a matter of permanent interest to the reader. This, and the succeeding chapter, dealing with surveys in the tropics, should be read by all those who are engaged in abolishing malaria on paper, or who criticise those who, having tried the matter have ventured to state that there are difficulties and that the matter is not simply one of mosquitoes, shallow pools, and a few tins of Kerosene. Those who hold such views, and there are or were many, have not been into "the field."

Chapter VII is perhaps overlong for an "elementary guide," and the beginner might be dogmatically told that a diagnosis of malaria can be made in one way and one way only, viz.: by finding the parasites. Especially should the beginner not waste time counting leucocytes, not by any means so easy a procedure as may be generally thought; but should he be tempted to do so, he need have no fear that he will not find 300 leucocytes in a drop of blood "less than the size of a small pinhead" (p. 173). He will, in fact, experience difficulty in making a film containing less than 1,000 leucocytes. We were much puzzled by the graph on p. 86 as it did not correspond with the data in the text. The author, however, has kindly informed us that it is a hypothetical curve. We think the matter sufficiently important to note here lest the reader should think, as others, and the reviewer did, that it purported to represent the actual distribution of relapses and new infections, a matter on which it is difficult to get accurate knowledge. We have looked in vain for any account of "malarial neuralgia" in this chapter. Is it omitted because it does not exist? The difficulty with regard to the various alleged nervous complications of malaria is that we have no satisfactory data as to their frequency in other conditions. This chapter is a good example of the author's simple intelligible description, but, like the succeeding one (Chapter VIII) on treatment, would gain, we think, by more conciseness. We do not think it requires nine and a half pages to tell a beginner, or administrator, how to treat the mildest, or the gravest, case of malaria; the matter has been clouded over by an impenetrable fog of verbiage in the Medical Press so that one runs the danger of doubting the evidence of one's own daily experience, viz.: that the treatment of malaria is a simple straightforward business. On p. 190 it is stated that "except quinine no drug has yet been

proved to have a specific action on the malaria parasites." Even if we admit that quinine is the best "specific" yet none the less organic preparations of arsenic and methylene blue are also specific.

On p. 203 we find a figure of "a patent protective headgear" against mosquitoes, and we are left wondering if people ever wear these appliances either at home or abroad!

To sum up, the book is clearly written in an interesting way and as an elementary guide should be useful to those who require one, and even the advanced student may read it with profit.

J. W. W. Stephens.

Dieudonné (A.). [Geh. Rat Prof. Dr.] & Weichardt (W.). [Prof. Dr.] **Immunität, Schutzimpfung und Serumtherapie.** (Zehnte umgearbeitete Auflage).—vii + 240 pp. 1920. Leipzig. Verlag von Johann Ambrosius Barth. [Price, Unbound 28 M, Bound 36 M.]

This is the tenth edition of a deservedly popular type of book that is but little represented in this country. The first edition by Dieudonné appeared in 1895 at a time when Diphtheria Antitoxin, perhaps the greatest achievement of immunological research, was on its trial, and summarised information on the scope and bearings of the new science was eagerly sought. Since that time the literature of the subject has attained colossal proportions and developments in connexion with diagnosis, protective inoculation and serum-therapy have been many and various. The authors devote a very considerable portion of the book to a discussion of Immunity, the chapters on which follow the usual lines that handbooks such as Kraus and Levaditi and Kolle and Wasserman have made familiar. Authors' names are cited, but no references are given, probably because of the fact that the book is intended to supply the needs of the practitioner and not those of the laboratory worker. Ehrlich's side-chain theory is still, in the authors' opinion, best calculated to explain the facts of immunity, and the familiar diagrams of interlocking joints and keys are reproduced. In the course of the chapters on protective inoculations, we learn that during the war, German troops received two doses of Cholera vaccine at 5–6 days interval, and repeated at the end of six months. The protective inoculations against Typhoid Fever consisted of 3 injections at 8 day intervals, and repeated after a lapse of six months.

Though many million inoculations were made, only a very occasional case of injury, and never a fatality resulted. The case mortality among the uninoculated was 9·6 per cent., among troops inoculated once, 8·7 per cent., among troops inoculated twice, 6·6 per cent., among troops inoculated three times, 5·3 per cent. and even sank to 2·6 per cent. among men repeatedly inoculated. The authors also state that the number of chronic carriers in the inoculated group was much smaller than in the uninoculated group. Nothing is said, however, about paratyphoid infections or of the constitution of the vaccine employed.

The chapters on serumtherapy supply what to the practitioner must be very useful information, viz., the names and addresses of commercial firms in Germany and Austria supplying the various brands of sera for human and veterinary use. With regard to many of these sera, such as Antituberculous serum, Pneumococcal serum, Deutschmann's serum, Hay Fever serum (Pollantin, Graminol) etc., the authors give little more information than would be contained in a trade pamphlet, and no attempt is made to weigh evidence. Important sera such as antidysentery serum and meningococcal serum are very inadequately treated, and no data are supplied from experience of their use in actual practice.

Three useful appendices bring the book to an end, the first dealing with the technical details of the most important immunity reactions, the second being a glossary of terms used in immunology ,and the third a classified list of commercial vaccines and sera for use in human and veterinary practice and for diagnosis.

J. C. G. Ledingham.

Correspondence.

Mense (Carl). **Handbuch der Tropenkranheiten. 2te Auflage. Band 5. Die Malaria und das Schwarzwasserfieber.** (von Prof. Dr. Hans Ziemann).—xx+602 pp. With 141 text figs. & 7 coloured plates. 1918. Leipzig: Johann Ambrosius Barth. [Price M.40.]

With reference to the review of this work by Prof. J. W. W. Stephens, F.R.S., Liverpool School of Tropical Medicine, which appeared in Vol. 15, No. 6, of this *Bulletin*, Prof. Dr. Hans Ziemann writes as follows:—

Goethestr. 82,
Charlottenburg,
4 Sept., 1920.
[Received Sept. 23, 1920.]

To the Editor of the *Tropical Diseases Bulletin*.

Dear Sir,

Every author of a scientific treatise must be prepared for criticism. It is obvious that if his work is well done it will be recognized as good and that if it is badly done it will not find approval at the hands of the just and objective critic.

For the first time in my life, and I may add, greatly to my regret, I feel compelled to protest against the injustice of a review, namely that by Dr. J. W. W. Stephens bearing on my Monograph on Malaria and Blackwater Fever which appeared in the *Tropical Diseases Bulletin* Vol. 15, No. 6 (June 15, 1920). I would have let the matter pass if the review had appeared in an obscure journal, but the Bulletin is a publication of such high standing that an adverse review appearing in it must of necessity carry weight with readers throughout the English speaking world. The monograph referred to is a serious contribution, the life's work of an author whose labours in the field in which he has worked have received recognition for, prior to the war, he was elected honorary Member of the Societies of Tropical Medicine in England and in Italy and made Associate Member of the corresponding Society in France.

The review by Dr. Stephens is worded in a manner that is bound from the start to arouse unfavourable prejudices in the mind of an uncritical reader.

To begin with, Dr. Stephens would appear to me to have curious notions as to what is required of a text-book. Surely it is demanded of the author of such a book that he shall present the views of different leading authorities on controversial matters, that he shall weigh all the evidence and finally state his own conclusions as I have done throughout. My preface states clearly that matters having more casuistical, literary, or purely scientific value are printed in small type so as to enable the reader to gain a clear insight and rapid survey of what is essential and of practical value by confining his attention, if he wills, to what is printed in large type. This arrangement is intended to meet the requirements not only of students and practitioners, but also of investigators in isolated parts of the world, since it affords a summary of a mass of literature which is necessarily inaccessible to many. For instance it is natural that with this arrangement of the text certain subjects should be referred to in small print:—Thus as a matter of historical interest, under "Therapy," we find mention of Warburg's tincture; whilst Opsonins in Malaria, about which to my knowledge no experimental conclusions have been reached, are treated as subsidiary matter. Dr. Stephens objects to this.

Dr. Stephens' criticisms regarding "masked malaria" are distorted and entirely beside the mark, for this condition is known to be of prime importance to the practitioner. The matter deserves special mention and the difficulty of an objective diagnosis in such cases is dwelt upon by me intentionally.

Passing over Dr. Stephens' further criticisms which are similar to the foregoing, I shall refer in conclusion to his remarks upon the after-treatment of malaria. According to Dr. Stephens this section only represents a jumble of all sorts of opinions. But it is precisely in this section that the opinions of others are given and weighed critically.

Every objective reader who understands German and does not merely skim the pages of the Monograph will find detailed conclusions at the end, where, on the basis of well weighed evidence, I advance my own system of after-treatment and also of prophylaxis. This method (Quinine on Wednesdays and Saturdays or Sundays, 4 x 0·3 gm.) has proved itself invaluable with us during the war. Dr. Stephens, however, agitates himself about Warburg's tincture and a few data relating to malaria-relapses (cited from the literature) whilst he neglects completely to mention much more important chapters including the whole section on Blackwater Fever. So much for Dr. Stephens' method and style of reviewing.

It is a source of gratification to me to state that but for Dr. Stephens' strictures the Monograph has been most favourably reviewed throughout. An English translation has been called for from America.

I remain,
Yours faithfully,
(*signed*) H. Ziemann.

Reprints and Pamphlets received :—

BALFOUR (Andrew). Links with the Tropics. Popular Lecture.—Reprinted from the *Jl. Roy. San. Inst.*, 1920. Vol. 41. No. 1. pp. 22–30.

BENOIT-BAZILLE (H.). Note sur une *Grahamella* : *Grahamella musculi*, n. sp. trouvée dans le sang de *Mus musculus*.—Reprinted from *Bull. Soc. Path. Exot.*, 1920. June 9. Vol. 13. No. 6. pp. 408–416. With 1 plate.

BLANCHARD-ZABOROWSKA (R.) & JOYEUX (Ch.). Sur quelques coiffures indigènes en Afrique occidentale française.—Reprinted from *Revue Anthropologique*, 1920. May–June. Vol. 30. No. 5–6. pp. 124–128.

BRUMPT (E.). Au sujet des rapports entre l' *Onchocerca volvulus* et la gale filarienne.—Reprinted from *Bull. Soc. Path. Exot.*, 1920. July 7. Vol. 13. No. 7. pp. 535–539.

——. Chaire de parasitologie et d'histoire naturelle médicale. Lecon inaugurale.—Reprinted from *Presse Méd.*, 1920. Feb. 14. No. 13. pp. 121–126.

CAWSTON (F. G.). Antimony in Leprosy.—Reprinted from the *Brit. Med. Jl.*, 1920. July 17th.

DEHAUT (G.). Note sur l'*Euproctus montanus*, Urodèle apneumone, caractéristique de la faune corse.—Reprinted from *C.R. Soc. Biol.* 1909. Oct. 23. Vol. 67. pp. 413–415.

HENRY (A.) & JOYEUX (Ch.). Contribution à la faune helminthologique de la Haute-Guinée française.—Reprinted from *Bull. Soc. Path. Exot.*, 1920. Mar. 10. Vol. 13. No. 3. pp. 176–182.

JOYEUX (Ch.). Enkystement d'une Cercaire du type *Cercaria armata* chez un Turbellarié d'eau douce.—Reprinted from *Bull. Soc. Path. Exot.*, 1920. Mar. 10. Vol. 13. No. 3. pp. 182–186.

KOP (W. A.). Het vitaminegehalte van aardappelen.—Reprinted from *Geneesk. Tijdschr. v. Nederl.-Indië*, 1920. Vol. 60. No. 1. 6 pp.

——. De diagnostek van malaria uit het leucocytaire bloedbeeld.—Reprinted from *Geneesk. Tijdschr. v. Nederl.-Indië*, 1920. Vol. 60. No. 3. 19 pp. With 15 charts in text.

LARROUSSE (F.). Espèces européennes du genre *Phlebotomus* (Rondani) [Dipt. Psychodidae].—Reprinted from *Bull. Soc. Entom. de France*, 1920. No. 4. pp. 65–67.

PONTANO (Tommaso). Ulteriore contributo alla diagnosi e alla cura medica dell'ascesso epatico dissenterico.—Reprinted from *Policlinico*. Sez. Prat., 1920. Vol. 27. No. 21, 22, 23, & 24. 20 pp.

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). List of the Anophelines of the Malay Archipelago with Special Reference to Adults and Larvae of New or Incompletely described Species or Varieties.—Reprinted from the *Bull. Entom. Res.*, 1920. Aug. Vol. 11. Pt. 1. pp. 77–92. With 11 text-figs.

TODD (John L.). *Spirochaeta recurrentis* : A Filter Passer.—Reprinted from the *Jl. Parasit.*, 1920. Mar. Vol. 6. No. 3. pp. 152–154.

ZIEMANN (Hans). Ueber wichtigere Probleme der modernen Malariaforschung.—Reprinted from the *Berlin. Klin. Woch.*, 1920. No. 28. p. 659 & No. 29. p. 687.

ZIEMANN (Hans). Ueber einen Fall von Angioneurose nach Skorpionstich.—Reprinted from the *Mediz. Klinik.*, 1920. No. 10.

Note.—On direct application (not through agents or booksellers) any of the foregoing reprints or pamphlets will be sent on loan to any part of the world, the Bureau paying outward postage.

Books received.

JOYEUX (Ch.). Cycle évolutif de quelques Cestodes. Recherches expérimentales. Supplement 2. 219 pp. With 7 plates.—1920. Paris: Laboratorie d'Evolution des Etres organisées, 3 rue d'Ulm. Léon LHOMME, 3 rue Corneille.

RIVAS (Damaso). [B.S. Biol., M.S., M.D., Ph.D., Assistant Professor of Parasitology & Assistant Director of the Course in Tropical Medicine, University of Pennsylvania.] Human Parasitology, with Notes on Bacteriology, Mycology, Laboratory Diagnosis, Hematology & Serology. 715 pp. 8vo.—With 18 coloured plates & 422 illustrations in the text. 1920. Philadelphia & London: W. B. Saunders Company, Ltd. [Price, cloth, 35*s.* net.]

Reports received.

ASSAM: Supplement to the Sanitary Report of the Province of Assam for the Year 1919. 19 pp. Shillong: Printed at the Assam Secretariat Printing Office. [Price 8 annas or 1*s.*]

COLONIAL OFFICE. Report of the Departmental Committee appointed by the Secretary of State for the Colonies to enquire into the Colonial Medical Services, together with a Letter from the Colonial Office to the Chairman of the Committee.—12 pp. 1920. September. London. Printed & Published by His Majesty's Stationery Office. [Cmd. 939.] [Price 2*d.* net.]

COMMISSIONE per lo Studio delle Opere di Piccola Bonifica. Seconda Relazione della Lotta antimalarica a Fiumicino (Roma). (Diretta dal Prof. B. GRASSI).—314 pp. With 10 plates, 1 chart & 10 figs. 1920. Rome. Supplement to the Annali d'Igiene. Vol. 30.

LAHORE. Report on Malaria in Thanesar Town, by Lt.-Col. C. A. GILL, I.M.S., Chief Malaria Medical Officer, Punjab & HARNAM SINGH, L.M.S., 1st Assistant to the Chief Malaria Medical Officer. 16 pp. + v pp. With 2 folding maps. 1920. Lahore: Printed by the Superintendent, Government Printing, Punjab. [Not for sale.]

MEDICAL RESEARCH COUNCIL (Privy Council). Special Report Series No. 52. The Science of Ventilation and Open-Air Treatment, Part 2. 295 pp. With 47 figs. & 5 plates. 1920. London: Published by His Majesty's Stationery Office. [Price 6*s.* net.]

NIGERIA (Northern): Annual Medical and Sanitary Report of the Northern Provinces for the Year ending 31st December, 1918. ii + 50 pp. 1920. Lagos, Nigeria: Printed and Published by the Government Printer. [Price not stated.]

NIGERIA (Southern). Annual Medical and Sanitary Report of the Southern Provinces for the Year ending 31st December, 1918. 111 pp. 1920. Lagos, Nigeria: Printed and Published by the Government Printer. [Price not stated.]

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This pamphlet was prepared by Col. KING at the request of Viscount MILNER, Secretary of State for the Colonies, for distribution to the Governments of the Tropical African dependencies.

Though small-pox takes a heavy toll of human life in most of our tropical possessions, it does not appear that an authoritative work on the institution and maintenance of vaccine establishments in these regions exists in the English language, and it is therefore difficult for the isolated worker to obtain information of the problems which confront him. Lieut.-Colonel Andrew BALFOUR has recently stated that when he was in East Africa during the war, he was asked to furnish a report on the locally manufactured lymph which had failed, and he then realised how valuable would be a publication treating the matter from a scientific standpoint as far as Africa is concerned,

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